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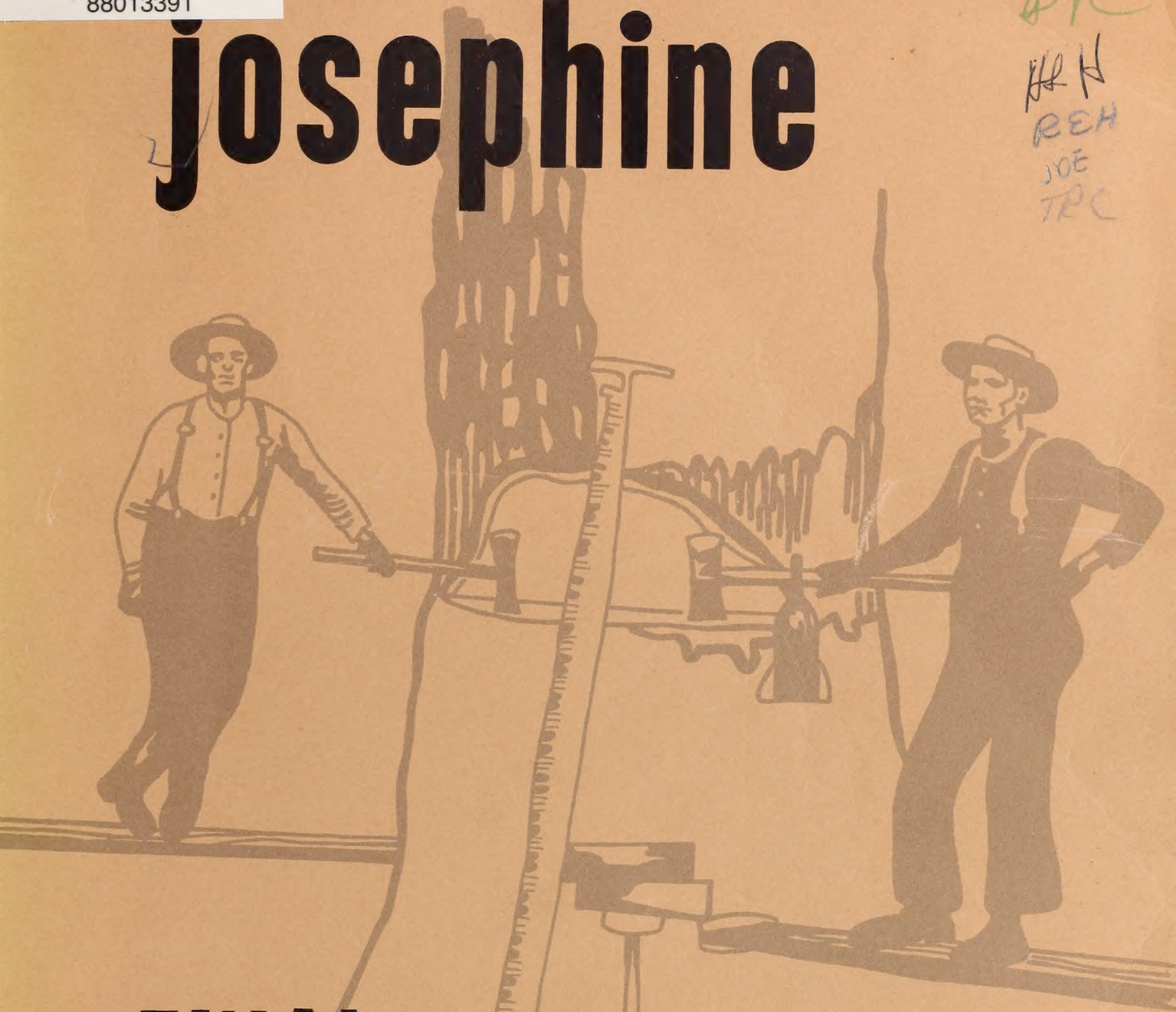

FINAL
timber management environmental statement

DEPARTMENT OF THE INTERIOR

FINAL

ENVIRONMENTAL STATEMENT

JOSEPHINE SUSTAINED YIELD UNIT

TEN-YEAR TIMBER MANAGEMENT PLAN

Prepared by

BUREAU OF LAND MANAGEMENT
DEPARTMENT OF THE INTERIOR

Frank Gregg

Director, Bureau of Land Management

SUMMARY

Draft ( ) Final (X) Environmental Statement

Department of the Interior, Bureau of Land Management

1. Type of Action: Administrative (x) Legislative ( )

2. Description of the Action: The Bureau of Land Management proposes a ten-year timber management plan for the 425,720 acres of public land in the Josephine Sustained Yield Unit of the Medford District (Oregon). Proposed annual timber harvest is 20.10 million cubic feet (103 MM bd. ft.), consisting of 94 MM bd. ft. as sustained yield allowable cut from high intensity forest management land and 9 MM bd. ft. as trial harvest from low intensity forest management land not included in the sustained yield computation base. Treatments implicit to the proposal include road construction, harvest employing predominantly shelterwood systems with some clearcutting, slash disposal, site preparations predominately with herbicides, planting of trees, herbicide release of established plantations, precommercial thinning, fertilization, and commercial thinning.

3. Summary of Environmental Impacts: This proposed action would reduce annual timber harvest from the Josephine SYU by 8.53 million cubic feet (43 MM bd. ft.). While employment in logging and associated log manufacturing is cyclic, dependent on national demand for wood products, a net of approximately 450 local and 50 nonlocal jobs (direct and indirect) would be lost. Annual revenue distributed to the O&C counties would decline about $3.3 million based on recent stumpage values. The lesser harvest would reduce present level direct impacts on climate, soil, and water quality. Increased intensity of forest development practices would increase impacts on air quality, vegetation and animals associated with the old growth forest. Potential for impacts from application of herbicides and fertilizer on air quality, water resources, aquatic animals, and aquatic vegetation is possible, but not probable. Degree of impact on previously unidentified cultural resources is dependent upon success of pre-disturbance cultural resource surveys which are part of the proposal.

4. Alternatives Considered:

   (1) No Control of Competing Vegetation.
   (2) Control of Competing Vegetation With All Available Herbicides Except Silvex.
   (3) Limited Investment in Timber Production.
   (4) Utilization of Surplus Inventory.
   (5) Forestry Program for Oregon.
   (6) Zane Grey Wilderness Study Area.
   (7) No Action.

5. Comments Were Requested From: (See attachment on next page.)

6. Date Statement Made Available to EPA and the Public:

   Draft Statement: March 8, 1978
   Final Statement:

Comments on the draft environmental statement were requested from the following. Agencies and organizations which prepared written responses to the draft statement are indicated by an asterisk.

Federal Agencies

Advisory Council on Historic Preservation*
Department of Agriculture
- Forest Service*
- Soil Conservation Service

Department of Commerce
- National Marine Fishery Service

Department of Defense
- U.S. Army Corps of Engineers*

Department of Energy
- Bonneville Power Administration*
- Region X*

Department of the Interior
- Fish and Wildlife Service*
- Geological Survey*
- Heritage Conservation and Recreation Service*
- Bureau of Mines
- Bureau of Reclamation*

Department of Transportation
- Federal Highway Administration

Environmental Protection Agency*
Small Business Administration

State and Local Government

Oregon State Clearinghouse*
Oregon State Historic Preservation Officer*
Rogue Valley Council of Governments (Regional Clearinghouse)*
Boards of County Commissioners
- Coos County
- Curry County
- Douglas County
- Jackson County
- Josephine County*

Interest Groups

Ada County (Idaho) Fish and Game League
American Association of Range Management
American Forest Institute
Associated Oregon Industries
Association of O&C Counties*
Federation of Outdoor Clubs - Oregon
CHEC*
Friends of the Earth
Headwaters Association*
Industrial Forestry Association*
Izaak Walton League*
Jackson County Stockmen's Association
Josephine Conservation Coalition
League of Women Voters
National Resource Defense Council*
National Wildlife Federation
Oregon Cattlemen's Association
Oregon Council of Rock and Mineral Clubs*
Oregon Environmental Council
Oregon Forest Protection Association
Oregon Natural Heritage Program*
Oregon Student Public Interest Research Group
Northwest Timber Association*
Pacific Northwest Four-Wheel Drive Association
Rogue River Legal Action Committee
Rogue Valley Bird Fanciers
Rogue Valley Guides Association
Sierra Club
Society of American Foresters
Southern Oregon Resource Alliance
Southern Oregon Timber Industries Association
The Wilderness Society*
Western Forest Industry Association*
Wildlife Management Institute*

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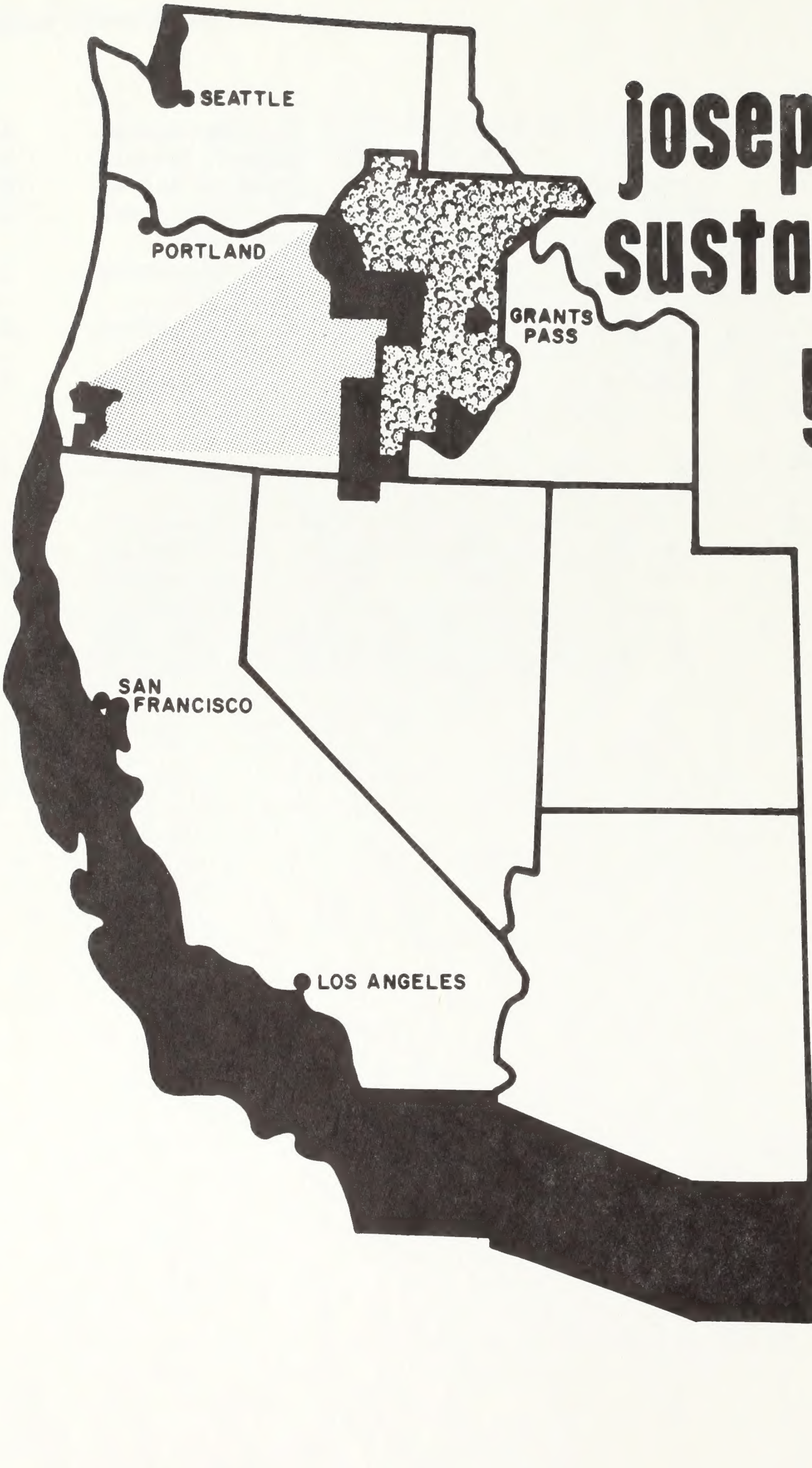
josephine sustained yield unit



1. DESCRIPTION OF THE PROPOSED ACTION

The proposed action is a 10-year timber management plan for public lands administered by the Bureau of Land Management in the Josephine Sustained Yield Unit (JSYU), Medford District, Oregon. In the plan, the Bureau of Land Management (BLM) proposes an annual timber harvest of 20.10 million cubic feet (approximately 103 million board feet Scribner Log rule) to be accomplished by two-stage shelterwood and clearcut methods. Also included in the proposal are reforestation, herbicide application, slash disposal, road construction, thinning, and fertilization. Table 1-1 summarizes the proposal by acreage and management classes. Appendices A and B, respectively, provide illustrations of an annual timber sale plan and an annual herbicide spraying plan. Annual plans together with all supportive and analytical materials, are available for review in the Medford District Office of BLM each year in advance of the action.

This is a proposed harvest level: final decisions with regard to land use allocation, and sustained yield allowable cut in the JSYU cannot be made until 30 days after the environmental statement has been filed with the Environmental Protection Agency (EPA).

The proposed amount of harvest is 43 million board feet less than the present annual harvest level. A comparison between the proposal and the present 10-year timber management plan may be found in Section 1.9.

1.1 POLICY AND GUIDELINES

A landmark law of singular importance to the proposal is the Revested Oregon and California (O&C) Railroad and Reconveyed Coos Bay Wagon Road (CBWR) Grant Lands Act of 1937 (50 Stat. 874; 43 U.S.C. 1181a, et seq.). This legislation was the first to specify sustained yield management for Federal lands. Under this Act those O&C lands classified as timberlands are managed under sustained yield principles in order to provide a permanent source of timber supply, protect watersheds, regulate stream flow and to provide recreational facilities. Approximately 89 percent of the public land in the JSYU is O&C land.

Intermingled public domain lands in the JSYU (approximately 11 percent of the total) were brought under sustained yield management principles by the Bureau's 1969 application to withdraw these lands from entry under all public land laws except certain disposal acts. Withdrawal was completed by Public Land Order 5490 (40 FR 7450).

In addition many activities of the BLM are governed by the Federal Land Policy and Management Act of 1976 (90 Stat. 2743, 43 U.S.C. 1701). This law, often referred to as BLM's "Organic Act" or as the FLPMA, established policy for BLM administration of public lands under its jurisdiction. Four provisions of the Act have particular application to this proposal:

-- Broad management authority under the principles of multiple use and sustained yield.

TABLE 1-1
Summary of Proposal

a) Area by Management Class and Planned Annual Harvest

	Management Class		
	High Intensity Lands	Low Intensity	Limited Mgmt. Lands
Area in Class (acres)	222,058	55,675	79,471 357,204
Planned Annual Harvest in millions of cubic feet (million board feet Scribner equivalent)	18.34 (94)	1.76 (9)	none

b) Ten-Year Plan of Prescribed Management Treatments

	Approximate Area in Acres		
Treatment	High Intensity Lands	Low Intensity	Limited Mgmt. Lands
Transportation System			
Construct 500 miles of permanent road	3,940	400	unknown
Reconstruct 100 miles of existing road	0	0	0
Surface 50 miles of existing road	0	0	0
Shelterwood Harvest			
Regeneration Cut	36,000	5,000	unknown
Final Harvest Cut	9,000	0	(see Section 1.1.3)
Clearcut	5,000	none	none
Slash Disposal			
Burning	10,000	100	unknown
Gross Yarding (including machine piling)	30,000	3,500	unknown
Site Preparation			
Herbicide	33,500	1,000	none
Mechanical Scarification	160	0	none
Planting			
Replant or Interplant (existing non-stocked or understocked clearcuts)	9,200	0	none
Initial Planting (new clearcut or shelterwood regeneration cut areas)	41,000	0	none
Replant & Interplant (new cutting areas not adequately stocked by initial planting, includes areas receiving overstory removal)	12,300	0	none
Herbicide Release	13,200	0	none
Precommercial Thinning	14,200	0	none
Fertilization	18,900	0	none
Commercial Thinning	4,700	0	none

-- Periodic and systematic inventory of the public lands and the resources they contain.

-- Comprehensive land use planning.

-- Protection of scientific, scenic, historical, ecological, environmental, air and atmosphere, water resource and archeological values.

However, in accordance with Section 701(b) of the FLPMA (43 U.S.C. 1701(b)) any such provisions do not apply to the O&C lands if they conflict or are inconsistent with the timber management or revenue disposal provisions of the O&C Act of 1937.

Numerous other laws also apply to the public lands. The more significant of these are listed in Appendix C.

Harvest of timber in the JSYU is done under the policy of annual allowable cut at a sustained yield level. Allowable cut planning is undertaken periodically to determine the undiminishing sustainable level of harvest from lands used for timber production. Normally the determination cycle is every 10 years, but it may occur more often in the event of change in land use, forest condition or technology.

All technically feasible, economically justified, and environmentally acceptable intensive forest management practices that are foreseeable in a 20-year planning horizon are anticipated in computing the sustained yield level. Computations recognize intermediate harvests, e.g., thinnings, as an element of the allowable cut. The present and future effect of the adopted practices upon forest productivity is immediately reflected in the determination of annual harvest. This factor, often referred to as allowable cut effect (ACE), allows for immediate recognition of future growth levels which will occur in a managed forest.

BLM has adopted the policy guidelines for timber management contained in the Senate Subcommittee on Public Lands report of 1972 entitled "Clearcutting on Federal Timberlands." The guidelines cover three issue areas; following is the summary from the Senate report:

"<u>Allowable Harvest Levels</u>

-- Allowable harvest on Federal forest lands should be reviewed and adjusted periodically to assure that the lands on which they are based are available and suitable for timber production under these guidelines.

-- Increases in allowable harvests based on intensified management practices such as reforestation, thinning, tree improvement and the like should be made only upon demonstration that such practices justify increased allowable harvests and there is assurance that such practices are satisfactorily funded for continuation to completion.

If planned intensive measures are inadequately funded and thus cannot be accomplished on schedule, allowable harvests should be reduced accordingly.

Harvesting Limitations

Clearcutting should not be used where:

-- Soil, slope or other watershed conditions are fragile and subject to major injury.

-- There is no assurance that the area can be adequately restocked within five years after harvest.

-- Esthetic values outweigh other considerations.

-- The method is preferred only because it will give the greatest dollar return or the greatest unit output.

Clearcutting should be used only where:

-- It is determined to be silviculturally essential to accomplish the relevant forest management objectives.

-- The size of clearcut blocks, patches or strips are kept at the minimum necessary to accomplish silvicultural and other multiple-use forest management objectives.

-- A multidisciplinary review has first been made of the potential environmental, biological, esthetic, engineering and economic impacts on each sale area.

-- Clearcut blocks, patches or strips are, in all cases, shaped and blended as much as possible with the natural terrain.

Timber Sale Contracts

Federal timber sale contracts should contain requirements to assure that all possible measures are taken to minimize or avoid adverse environmental impacts of timber harvesting even if such measures result in lower net returns to the Treasury."

Herbicides, when employed, are selected to meet a specific problem and used at manufacturer's recommended strength for the specific target species involved at necessary intervals. Feasible alternatives to the use of herbicides are investigated. No chemical is used when there is a basis for belief that water quality will be degraded or that hazards exist which will unnecessarily threaten fish, wildlife, their food

chains or other components of the natural environment. Proposed annual herbicide projects are submitted through a Departmental review process (see Section 1.6.4.2) each year prior to approval of any project.

In addition, policy provides for maintenance of two lists by USDI--prohibited chemicals and restricted chemicals. Those on the prohibited list may not be employed under any circumstance. Those on the restricted list are used only when there is no alternative technique and then in relatively small scale application.

1.2 MANAGEMENT CLASSES

Analysis of inventory data disclosed wide variation in production capability of commercial forest lands in the JSYU. Three timber management classes reflecting this variation were identified through a series of procedures described in Section 1.4. Different management prescriptions are proposed for each management class.

Table 1-1 summarizing the proposal shows the area by management class, proposed annual harvest and prescribed management treatments to take place during the 10-year period. The order or sequence of treatments as listed is typical, although not every acre would necessarily receive the same combination of treatments. A discussion of treatments and sequence of treatments may be found in Section 1.6.

1.2.1 High Intensity Forest Management Lands

The high intensity category may also be referred to as the timber production base. These commercial forest lands are suitable for continuous timber production with reasonable assurance of successful results from the application of intensive timber management practices. Specific practices and actions shown in Table 1-1 would take place during the first decade. Operation at the indicated level would be necessary to attain the computed undiminishing annual allowable cut of 18.34 million cubic feet (94 MM bd. ft.) as described in Section 1.5.

Approximately 26 percent of the high intensity lands possess soil, topographic and climatic conditions suitable for clearcut harvest techniques. Regeneration can be accomplished within 5 years of harvest with standard artificial reforestation methods.

Approximately 74 percent of the high intensity lands exhibit characteristics which would make regeneration within 5 years unlikely if they were clearcut. Two-stage shelterwood harvest technique is proposed for these areas. Establishment of a new stand could be accomplished within 5 years of the regeneration cut under this prescription.

1.2.2 Low Intensity Forest Management Lands

Low intensity lands are commercial forest land by definition since they are capable of growing in excess of 20 cubic feet of commercial coniferous species per acre per year. They are not included in the timber production base for allowable cut determination because the regeneration period is expected to be in excess of 5 years after clearcutting or after the regeneration cut of a shelterwood regime.

The objective of the trial harvest program from low intensity

lands would be to determine what practices might be effective to facilitate regeneration within the prescribed 5-year period, and to gather empirical data on the actual regeneration period. No sustained yield allowable cut is proposed for the low intensity lands.

A trial management program for the first decade is proposed involving approximately 500 acres of low intensity lands per year. Planned annual harvest resultant from the trial management program is 1.76 million cubic feet (9 MM bd.ft.) during the one-decade trial period.

Due to the harsh site conditions, clearcutting would probably convert such areas to non-commercial forest classification. A two-stage shelterwood cutting system would be employed. Residual trees would provide shade and seed source to obtain natural reforestation following the regeneration cut. After reproduction has become established the final harvest cut would be made. It is unlikely that any final harvest cut would occur on low intensity lands in the first decade since it is not expected that regeneration would occur within the proposal period.

Implicit in the proposed trial management program is use of herbicides for site preparation in good seed years to assist natural regeneration, and approximately 1,000 acres would be so treated during the trial period. Trials of other intensive forestry practices such as planting, release spraying, or thinning will be initiated on low intensity lands during the initial decade under the Forestry Intensified Research (FIR) program discussed in Section 1.7.2. No firm plans in this regard are available, however, and these practices are not part of the proposal.

1.2.3 Limited Forest Management Lands

Approximately 79,500 acres of commercial forest land have only limited forest management potential. These lands are characterized by shallow rocky soils, extremely droughty conditions resulting in severe regeneration problems, highly erodible soils, high water tables, and/or very steep slopes. Regeneration time, if these lands were logged, would be considerably in excess of 5 years, and successful artificial reforestation would be uncertain.

No planned annual harvest is proposed from these lands because of probable site degradation. Harvesting would be restricted to mortality-salvage or road right-of-way timber if it should become necessary to construct roads through any limited management land. No volume figure is projected or included in the proposal.

1.3 LOCATION

The Josephine SYU constitutes the western half of the Medford District, Bureau of Land Management. The SYU encompasses an aggregate area of over 850,000 acres, of which approximately 425,720 acres are public lands administered by BLM (Table 1-2). Portions of five counties are contained within the SYU (Figure 1-1, the folded map in the back cover pocket). The unit is bounded on the west by the Siskiyou National Forest and on the south by the Siskiyou and Rogue River National

TABLE 1-2

Land Jurisdiction in the Josephine Sustained Yield Unit

	Acres[1]							
	Public Lands							
County	O&C[2]	PD[3]	Acquired[4]	Total	State Lands	County Lands	Other Lands	Total Area JSYU
Coos	2,228.06	--	--	2,228.06	--			2,228
Curry	36,358.32	40.05	207.33	36,605.70	--	--	1,329	37,935
Douglas	77,026.44	3,099.79	--	80,126.23	7,240	45	83,474	170,885
Jackson	12,429.09	2,799.03	--	15,291.12	640	--	16,872	32,803
Josephine	250,957.48	38,943.81	1,567.22	291,468.51	7,470	28,030	286,024	612,993
Totals	379,062.39	44,882.68	1,774.55	425,719.62	15,350	28,075	387,699	856,844

Footnotes

1/ Acreage figures for public lands are derived from BLM master title plats. Other acreage figures are BLM estimates.
2/ Revested Oregon & California Railroad Grant Lands.
3/ Public Domain Lands.
4/ Lands acquired under authority of the Natonal Wild & Scenic Rivers Act.

Forests; it abuts BLM's Jackson Sustained Yield Unit on the east. The northern boundary is conterminous with portions of three BLM sustained yield units -- South Coast, Douglas and South Umpqua -- and the Umpqua National Forest is at the northeast corner.

1.4 DETERMINATION OF LANDS INCLUDED IN THE PROPOSAL

The determination of which lands within the JSYU would be included in the proposal is based on several inventories and land use allocations for other resources.

1.4.1 Inventories

Inventories provide information on the resources of the land and are conducted in accordance with BLM procedures, often based on research data of other agencies and institutions. The following sections describe inventories which have been accomplished in the JSYU.

1.4.1.1 Timber

Forest inventories in western Oregon are of two types, intensive and extensive. Intensive inventories include two classification systems to identify commercial forest land capable of producing timber on a sustained yield basis and lands amenable to acceleration of growth when subjected to specific practices. An extensive inventory samples commercial forest land for volume and growth rates to permit calculation of the allowable cut.

Timber Production Capability Classification (TPCC)

The Timber Production Capability Classification (TPCC) is an intensive inventory process initiated in 1972 to partition all public land administered by BLM in western Oregon into productivity categories. Categories are based upon the land's physical and biological capacity to produce timber. Table 1-3 shows the results of TPCC in the JSYU. Figure 1-2 is an example of a resultant aerial photo map.

The purpose of this classification is to identify commercial forest land which could be managed on a sustained yield basis as the timber production base for computation of the annual allowable harvest. As new data become available from intensive on-site analysis, management direction may be altered on specific tracts.

Criteria Used to Define Major TPCC Classes

Forest Land. By definition, forest land is land that is now, or is capable of becoming, at least 10 percent stocked with forest trees (native, woody plants capable of attaining heights of at least 20 feet) and has not been developed for non-timber use. Approximately 399,649 acres of the Josephine SYU fall into this category. Forest land is further classified as follows:

Commercial Forest Land. Forest land that is now producing or is capable of producing at least 20 cubic feet per acre per year of commercial coniferous tree species. Commercial forest land constitutes 364,456 acres in the JSYU.

Problem Sites. A subclass of commercial forest land which identifies problems due to 1) adverse location, 2) fragile areas, and 3) problem reforestation areas. This subclass of land is either withdrawn

Table 1-3

Timber Production Capability Classification - 1972

Category		Acres	
Forest Land			399,649
Commercial Forest Land in Base		229,310	
Non-Problem Sites	119,092		
Physical Problem Sites	23,249		
Reforestation Problem Sites	86,969		
Commercial Forest Land Excluded from Base		135,146[1/]	
Physical Problem Sites	43,853		
Reforestation Problem Sites	91,293		
Non-Commercial Forest		35,193	
Non-Commercial Species	9,557		
Non-Commercial, low site	25,636		
Non-Forest Land			26,071
Total public lands administered by BLM in the JSYU			425,720

[1/] Approximately 55,675 acres of the 135,146 acres excluded from the timber production base due to problems have some management potential and are referred to as low intensity lands.

Figure 1-2 PORTION OF TPCC PHOTOMAP T. 32 S., R. 4 W. (HALF SCALE)

from the timber production base or is restricted to or from certain management practices.

Adverse Location. Problem sites which, because of their physical isolation, are difficult or impossible to manage for sustained yield timber production. Most problem sites classified as adverse location will be withdrawn from the timber production base due to the lack of special techniques to improve geographic accessibility.

Fragile Areas. Problem sites whose timber growing potential is easily reduced or destroyed; e.g., loss of timber growing potential may result from soil erosion and mass wasting. These sites may be restricted if special techniques are available to protect the site from damage due to road construction, logging activities, etc. If such special techniques are not available, the site is withdrawn from the timber production base.

Problem Reforestation Areas. Problem sites with lands upon which standard reforestation treatments, following clearcutting or shelterwood cutting, are expected to result in either 1) an "unstocked" condition after 5 years, or 2) a "stocked-unestablished" condition after 15 years.

Non-Problem Sites. Commercial forest land that is not classified as Adverse Location, Fragile Site, or Problem Reforestation Area.

There are some commercial forest lands in the Josephine SYU that fall within this subclass which either support research projects, are encumbered by old mining claims, or are within the Rogue Wild and Scenic River withdrawal. These lands are excluded from the timber production base.

Non-Commercial Forest Land. Land which is not capable of yielding at least 20 cubic feet of wood per acre per year of commercial species, or land which is capable of producing only non-commercial tree species. These 35,193 acres are withdrawn from the timber production base.

Low Site. Non-commercial forest land which is not capable of yielding at least 20 cubic feet of wood per acre per year of commercial species.

Non-Commercial Species. Non-commercial land on which only non-commercial tree species are capable of growing. Non-commercial species include all hardwoods, whether merchantable or non-merchantable.

Non-Forest Land. This includes land that has been developed for non-timber uses or land that is incapable of being 10 percent stocked with forest trees.

Examples of non-forest land are roads, rock outcrops, urban areas, and resort areas. These lands are

automatically excluded from the timber production base. The Josephine SYU contained 26,071 acres of land in the non-forest category when the TPCC was conducted.

Operations Inventory (OI)

For BLM to carry out the timber management program effectively, specific information as to the location and current condition of the various forest types within the land base must be available to the managers. This is accomplished through the Operations Inventory (OI).

The OI is an intensive inventory providing forest type maps which show the location and identification number of each homogeneous coniferous type island. Corresponding cards list acreage, silvicultural needs and opportunities for forest management practices such as mortality-salvage or thinning. Operations Inventory thus provides a basis for establishing priorities for treatment based on stand conditions and productivity.

1976 Reinventory

A reinventory of commercial forest land in the JSYU was completed in 1976 employing procedures for extensive inventory jointly developed by the USFS and BLM (USFS 1976). The reinventory uses the same basic inventory design as was used for determination of the present allowable cut, but with further refinement to include stratification of commercial forest land based on information obtained from the Operations Inventory and TPCC.

1.4.1.2 Other Resource Inventories

Other inventories were conducted to identify and categorize specific resource capability and potential. A detailed soil survey for the entire Medford District was completed in December of 1975. Recreation planners applied portions of the BLM's Recreation Information System, an inventory approach for determining inherent potential of the land to support various recreation activities. Visual resource specialists inventoried and classified the JSYU for visual and esthetic considerations. Wildlife biologists inventoried deer and elk winter range and spotted owl nest sites. Fisheries biologists conducted stream surveys of Class I and Class II streams.

1.4.2 Land Allocations for Other Resources

The final step in determination of lands included in the proposal involved application of the Bureau planning system. A discussion of the application of this system to the JSYU is contained in Section 1.8.1.

Some previous land use allocations were not subject to review in the planning system. Public lands within the designated boundary of the Rogue Wild and Scenic River, for instance, were withdrawn in 1969 through Congressional action. Table

1-4 summarizes land allocations to other resource considerations in the JSYU. Table 1-5 provides an estimate of old growth timber acreage which will remain essentially unaltered by the 10-year timber plan.

Table 1-6 displays the interaction of various steps in the evolution of the proposal. TPCC data identify the commercial forest land which may be included in the timber production base. Timber production potential is determined from reinventory and the TPCC classification. The proposal represents resource considerations which are beyond those incorporated in TPCC and which were identified and dealt with through the planning system.

1.5 ALLOWABLE CUT DETERMINATION

The sustained yield allowable cut is determined in accordance with the objectives of the proposal and based on land use allocation arrived at through the Bureau planning system. Allowable cut in the proposal would be the annual harvest from high intensity lands. Volume attained through trial harvest on low intensity land, while planned and proposed for the first decade, is not predictable into the future and therefore would not be part of the proposal beyond the first decade.

1.5.1 The Present Forest

The reinventory completed in 1976 found the forest distribution as displayed in Table 1-7. Age classes range from non-stocked, where reproduction has not been established, to 350 years. The growth falloff in older classes should be noted. Growth falloff in overmature trees is related to loss of wood to disease and higher mortality rates.

The distribution of acres by 10-year age classes in the present forest is far from the ideal distribution desired in a managed forest. Whereas a managed forest would have approximately equal areas for each age class sought, the present forest is as shown in Figure 1-3.

1.5.2 Unit of Measure

Within a 20-year planning horizon the forest objective was set to maximize yield of timber suitable for the production of lumber and plywood. Considering the objective, cubic feet appears to be the most meaningful and accurate unit. Thus, all allowable cut calculations for the SYU are carried out in cubic feet. For convenience, board foot Scribner equivalent is computed and frequently cited.

1.5.3 Management Assumptions

A wide range of possible management practices was considered. The practices used in the forest simulation model (described in Section 1.5.4) for high intensity lands are varied harvest, reforestation, and growth stimulation techniques.

Harvest technique assumptions relate to land suitability relationships discussed in Section 1.4.1.1, TPCC. Prescribed harvest methods are a combination of the clearcut and two-stage shelterwood systems, dependent on site suitability. Intensive planting is planned following the regeneration cut of a shelterwood regime or clearcutting. Minimum planned harvest age would be 60 years. Approximately 4,000 acres

Table 1-4

Land Allocations for Resources Other Than Timber

A. Prior Land Use Allocations to be Continued (All Land Categories)

	Acres
Rogue River Corridor	11,087
Existing Recreational Areas	942
Wild Rogue Wilderness Area	8,874
Total	20,903

B. Proposed Exclusions of High Intensity Land From the Allowable Cut Base

Buffers, Class I Streams	1,600
Spotted Owl Reserves	873[1]
Botanical Sightseeing Areas	250
Rogue River Foreground (outside corridor)	1,300
Wild Rogue Wilderness Area (Congressional action)	405
Total	4,428

[1] The total area contained in six spotted owl management areas is 6,741 acres.

Table 1-5

Estimate of the Old-Growth Acreage Which Would Remain Essentially Unaltered by the Ten-Year Plan[1]

High Intensity Forest Management Lands	
Class I Streamside Buffers	1,600 acres
Wild Rogue Wilderness Area	405 acres
Spotted Owl Management Areas	873 acres
Potential Recreation Sites	1,300 acres
Botanical Sightseeing Areas	250 acres
VRM Class II Lands Adjacent to the Rogue "Wild & Scenic" River	1,300 acres
	5,728 acres
Low Intensity Forest Management Lands	49,700 acres
Limited Forest Management Lands	79,300 acres
Total	134,728 acres

[1] Exclusive of lands within the Rogue River Corridor.

Table 1-6

Evolution of the Proposed Action

Management Class of Commercial Forest Land	TPCC	Total Timber Production Potential		Proposed Exclusions		Proposed Action	
	TPCC	Area	Potential Annual Harvest	Reduced Area	Reduced Annual Harvest	Area	Planned Annual Harvest
	acres	acres	million cubic feet (million board feet)		million cubic feet (million board feet)		million cubic feet (million board feet)
High Intensity Lands	229,310	226,486 3/	18.67 (95)	4,428 4/	0.33 (1.7)	222,058	18.34 (94)
Low Intensity Lands 1/	> 135,146 <	55,675	1.76 (9)	0	0 (0)	55,675	1.76 (9)
Limited Management Lands 2/		79,471	0	0	0 (0)	79,471	0
Total Commercial Forest Land	364,456	361,632 3/	20.43 (104)	4,428	0.33 (1.7)	357,204	20.10 (103)

1/ Excluded from timber production base in TPCC; portion identified for trial harvest program through planning process.
2/ Excluded from timber production base in TPCC; no planned harvest proposed.
3/ 2,824 acres to non-forest category between time of TPCC and the reinventory.
4/ Numbers taken from Table 1-4 B.

Table 1-7

Age, Volume and Growth Distribution
High Intensity Lands

---------- YEAR 1976 ---------

AGE CLASS	ACRES	TOTAL VOL. M. CU. FT.	ANNUAL GROWTH CU. FT.	AGE CLASS	ACRES	TOTAL VOL. M. CU. FT.	ANNUAL GROWTH CU. FT.
non-stocked	10,894	-	-	170	3,843	19,744	56,120
1-5	1,729	-	-	180	969	5,111	12,420
10	18,211	-	-	190	2,335	12,595	25,759
20	6,203	-	-	200	1,938	10,650	17,919
30	5,508	7,398	218,132	210	2,335	13,027	17,420
40	3,663	6,338	138,524	220	3,303	18,644	18,744
50	2,309	4,848	83,197	230	2,317	13,189	9,011
60	6,044	14,813	206,981	240	3,522	20,154	7,408
70	3,601	10,027	116,889	250	13,765	78,934	4,374
80	3,400	10,540	104,293	260	14,257	81,674	-20,928
90	10,001	33,982	288,916	270	8,924	50,912	-29,035
100	4,741	17,437	128,495	280	969	5,488	-4,883
110	7,295	28,742	184,690	290	321	1,799	-2,191
120	4,164	17,423	97,986	300	47,929	264,908	-412,699
130	2,731	12,045	59,388	310	2,317	12,586	-24,088
140	6,422	29,664	128,185	330	4,634	24,043	-64,726
150	8,351	40,167	151,776	350	4,892	23,840	-85,801
160	8,426	41,984	138,093				
				Total	232,263	932,705	1,570,369

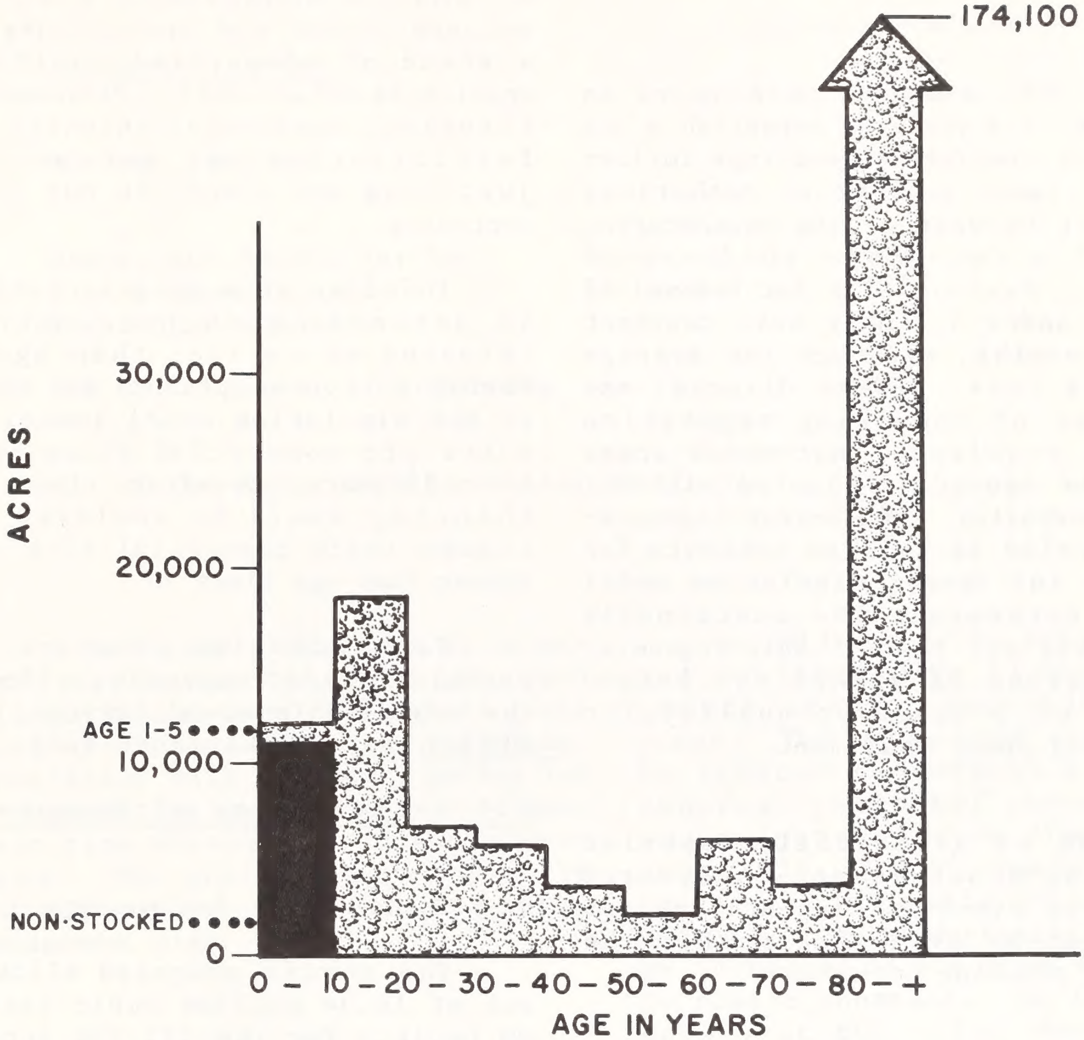


Figure I-3 AGE CLASS DISTRIBUTION • HIGH INTENSITY LANDS

SOURCE: BLM Forest Inventory • 1976

would be converted to non-forest during the first decade due to completion of the permanent road system.

It is expected to require an average of 4 years to establish a new stand of coniferous seedlings following a timber sale which authorizes clearcut harvest or the regeneration cut of a two-stage shelterwood regime. Maximum time for removal of timber under a timber sale contract is 36 months, although the average time is less. Slash disposal and control of competing vegetation may be required. Harvested areas would be seeded or planted within 1 year thereafter. The 4-year regeneration period is thus an estimate for use in the forest simulation model which determines the sustainable allowable cut level. This regeneration period is within the Bureau limit of 5 years to qualify for sustained yield management.

Use of genetically superior planting stock is not considered feasible since sufficient supplies will not be available within the 20-year planning horizon.

Use of herbicides for control of broadleaf competition to favor growth of commercial coniferous species is explicit in the proposal as part of timber stand reestablishment. Herbicides would be used for site preparation before planting on approximately 33,500 acres of high intensity lands during the first decade. Approximately 13,200 acres of established reproduction would be released from brush or grass competition by herbicide treatment during the same period.

Three intensive management practices are considered suitable following harvest and regeneration. Intensive management practices enhance growth and productivity once a stand of commercial coniferous species is established. Precommercial thinning, commercial thinning, and fertilization are economically justified and result in net volume increases.

Thinning at a 20-year interval is assumed, with precommercial thinning no earlier than age 13. Fertilization is planned and assumed in the simulation model immediately after pre-commercial thinning and every 10 years thereafter. Commercial thinning would be employed when stands reach commercial size -- no sooner than age class 30.

Each addition of an assumed practice has a cumulative effect on the sustainable annual harvest. This effect is displayed in Table 1-8.

1.5.4 Mechanics of Computation

1.5.4.1 High Intensity Lands

The annual proposed allowable cut of 18.34 million cubic feet (94 MM bd.ft.) for the 222,058 acres of high intensity lands was calculated with a computerized forest simulation model. This model projects the present forest, as described in Section 1.5.1, 400 years into the future. Based on the management assumptions as described in Section 1.5.3, it determines the largest allowable cut sustainable over the projection period. Age class distribution of forest stands, annual wood growth, wood volume, and acreage of certain treatments are also determined for each of the 40 decades.

Table 1-8

Effect of Assumed Practices on Annual Harvest Volume, High Intensity Lands

Assumed Practice	Sustainable Annual Harvest million cubic feet (million board feet)
Harvest and plant	12.58 (64)
Above, with herbicides for site preparation and plantation release	15.09 (77)
All of the above, with thinning	16.98 (87)
All of the above, with fertilization	18.34 (94)

A 400-year projection is necessary to insure that the proposed allowable cut is at the highest level that can be sustained, ad infinitum, consistent with the BLM's policy for a constant or increasing flow of wood over time without any planned reduction. The projection is not to be construed as a 400-year timber management plan.

The most critical elements that influence the magnitude of the proposed allowable cut are total wood volume and annual wood growth, present and future. As shown in Figure 1-4, the proposed allowable cut is approximately eight times the present current annual growth. This difference is primarily due to the preponderance of overmature stands in the JSYU, which are growing at low rates or not at all, as a result of high natural tree mortality.

As older stands are harvested and replaced with vigorous young growth stands, two things would occur: The total wood volume would be reduced as surplus timber was removed, but total annual growth would increase over time. By the year 2036, growth would begin to exceed the allowable cut, indicating that the cut theoretically could then be increased if all other things were to remain constant. It is approximately at this time that a forest comprised of an equal distribution of age class acreages, ranging from recently established stands through stands 80 years old, would be attained. From then on, total volume and annual growth would be in perpetual equilibrium and therefore annual cut equal annual growth.

Data derived from the simulation model for high intensity lands assure that 18.34 million cubic feet

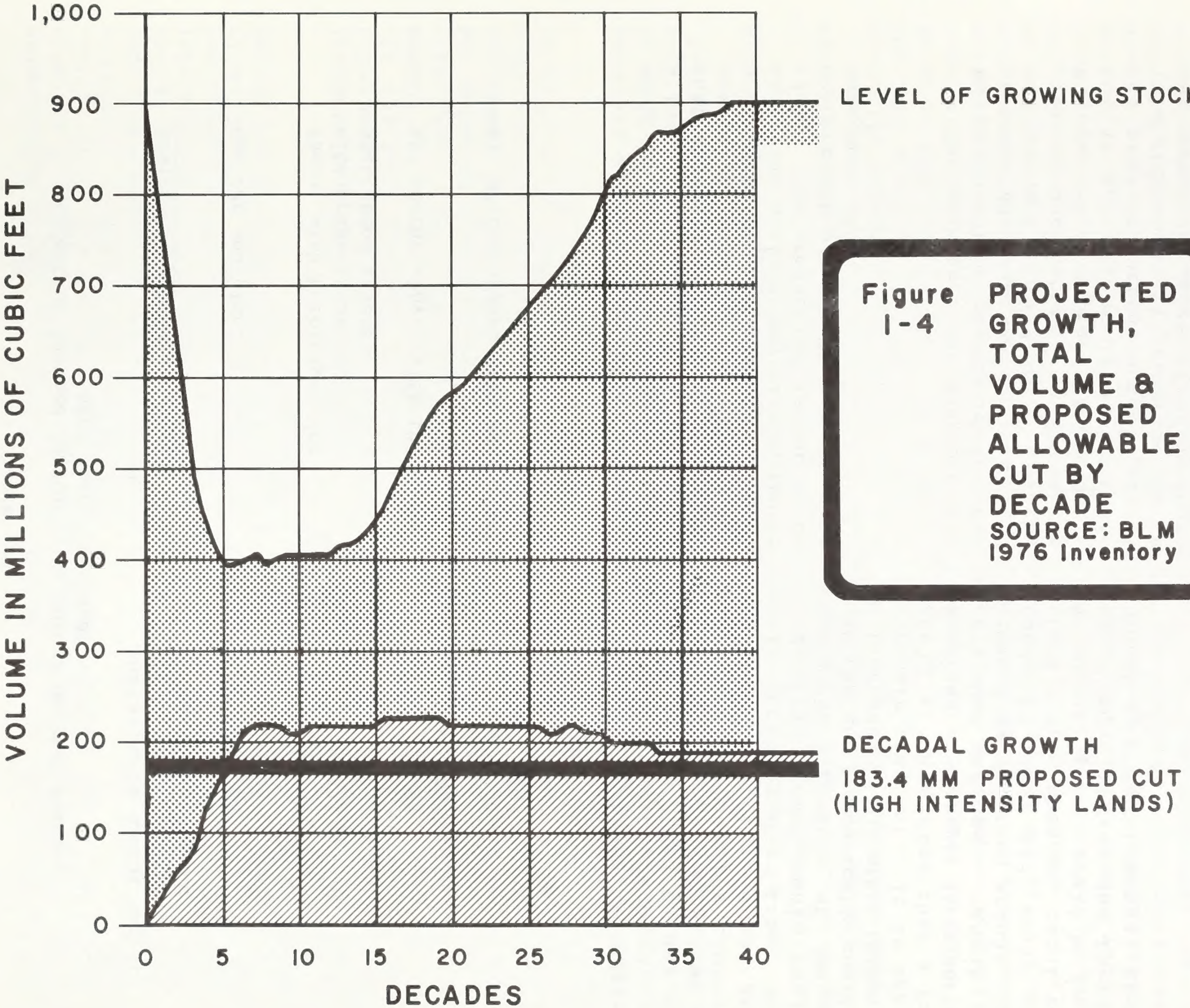


Figure 1-4 PROJECTED GROWTH, TOTAL VOLUME & PROPOSED ALLOWABLE CUT BY DECADE

SOURCE: BLM 1976 Inventory

(94 MM bd.ft.) is the highest sustainable annual allowable cut that could be harvested in the first decade without any planned future reduction. This is not to say that, in the next periodic updating of the timber management program, the allowable cut could not change. Technological advances, in conjunction with changing public needs and management assumptions, will influence future allowable cut computation.

In arriving at the proposed 18.34 million cubic feet cut for the high intensity lands, other allowable cut levels were considered. These levels relate to the alternative land uses and practices discussed in Section 1.8.1 and in Chapter 8, Alternatives. Reference should be made to these sections to ascertain their quantified impact on the allowable cut.

1.5.4.2 Low Intensity Lands

The proposed annual harvest of 1.76 million cubic feet from the 55,675 acres of low intensity lands is based solely on a 10-year projection period. It cannot be viewed as sustainable in context with allowable cut calculation procedures previously described. Future decade levels would be dependent upon the results of the trial program.

<u>1.5.5 The Future Forest</u>

During the fifth decade, harvest and utilization of old growth timber would be completed on high intensity lands. The forest of the JSYU would be dichotomous -- high intensity lands exhibiting one set of characteristics and lands categorized as low intensity and limited management exhibiting another.

Commercial forest lands excluded from the high intensity category probably would look much as they do today. The prescription for natural regeneration and two-stage shelterwood harvest would perpetuate the mixed coniferous, multi-aged forest configuration. Since there is no commitment in the proposal for continuation of trial harvest beyond the first decade, total effect and extent of harvest cannot be predicted.

Areas proposed for harvest in the high intensity category would be radically different from the present forest. On the basis of computer projection for the sixth decade, timber stands more than 80 years old would be rare. A typical 70-year old stand might exhibit the following characteristics:

Volume per acre
6,000-7,000 cu. ft.
(30-35 M bd. ft. Scribner)

Average diameter (Dbh)
15-20 inches

Trees per acre
200-225

Stocking would be controlled by thinning throughout the life of the stands. Competition from grass, brush, and non-commercial tree species would be controlled until commercial species attain dominance, usually within 20 years. The road system would be complete and provide ready access to all stands.

Because of the smaller tree sizes and the correspondingly smaller machinery needed to handle them, falling and yarding would have less impact on the site. In addition, better utilization and the small amount of cull material expected

would mean that slash disposal problems, as now known, would not exist.

People and machinery would be present within the stands much more frequently than at present. The planting and nurturing of seedlings would be followed, where needed, by pre-commercial thinning in age class 10. Fertilization would follow on a 10-year cycle. Commercial thinnings would begin at about 30 years of age and be repeated on a 20-year cycle.

1.6 DESIGN FEATURES INCLUDED IN THE PROPOSAL

Table 1-1 displays the proposed 10-year plan of prescribed management treatments in a typical sequence, beginning with road construction or improvement. Following harvest, either by shelterwood or clearcut, the sequence of treatments reflects those actions necessary to facilitate prompt reforestation of the specific tract, and subsequent growth of commercial coniferous species. The following discussion of treatments will be in the same order as listed in Table 1-1.

Not every treatment listed in Table 1-1 would be applied to every acre. An infinite number of treatment combinations is possible and could be employed. The purpose of this section is to elaborate on what each treatment entails and quantify, to the extent possible in a regional environmental statement, the magnitude of the actions. Treatments would be identified and scheduled through application of the Operations Inventory system. Determination of treatment needs for those actions to be required in the sales contract would be accomplished during timber sale planning.

Contracts, usually awarded on a competitive basis, are the vehicle for accomplishment of all timber harvest and many forest development practices. The standard and special provisions in a contract set forth the specifications to be followed by the contractor in carrying out the action in accordance with applicable laws, regulations, and policies.

In contract preparation, selection of special provisions is governed by the scope of the action to be undertaken. Stipulations define the methods for accomplishing the action and the manner in which it shall be accomplished. Contract sections dealing with road construction, type of harvest to be employed on a specific soil type and other soil related issues are governed by Medford District's Recommended Watershed Practices (see Appendix D). The provisions of the basic timber sale contract, Bureau form 5450-3 (see Appendix E), are applicable in all cases. Bureau Manuals and manual supplements provide a variety of approved special provisions for use, as appropriate, in individual contracts. The combination of selected special provisions constitute Section 41 of Form 5450-3.

Land use allocations and constraints on lands allocated to timber production, such as those discussed in Section 1.8.1, are implemented through project design. A principal means for determination of applicable special provisions during preparation of a contract for a forest practice is the environmental assessment

record (EAR). Refer to Section 1.8.4 for a discussion of specific action EARs.

In accord with BLM policy (Manual Section 6840), no actions would be taken which would jeopardize the continued existence of any Federally listed threatened or endangered animal or plant species. Also, BLM will comply with Oregon laws pertaining to State-listed species. Thus, where data are sufficient regarding these species, no jeopardizing action would be taken. Where data are insufficient, a survey of habitat where threatened or endangered animals would be expected and favored locale for threatened or endangered plants would be done in conjunction with site specific action planning. If it is determined from this survey that the proposed action would jeopardize this habitat, consultation with the U.S. Fish and Wildlife Service in accordance with 50 CFR 402 (43 FR 870) would be initiated. The action would be altered or abandoned as necessary.

As with threatened or endangered species, special surveys are required for evidence of historic or prehistoric human occupation. A Class III (complete survey) cultural resources inventory is required of all areas to be subjected to ground manipulation activities. This is accomplished in the preplanning stage of a treatment and results analyzed in the EAR addressing the action.

Tables 2-50 and 2-51 show the level and types of treatments which have been applied in the JSYU under the present harvest plan.

1.6.1 Transportation System

On the average, 50 miles of new permanent road would be constructed annually during the 10-year period. Standards, i.e., width of running surface, ditches, fills and type of surfacing if any, remain to be determined.

Since portions of the existing road system are underdesigned, obsolete or unsafe, approximately 100 miles of road would be reconstructed during the proposal period. Approximately 50 miles of existing road would be surfaced. Types of surfacing are unknown.

1.6.1.1 Scope of Treatment

Based on average construction experience in the JSYU, one perennial stream and four intermittent stream crossings would be involved in each mile of road construction or reconstruction. The breakdown, by stream classes defined in Section 2.1.2.2, Fishes, and as used in Table 1-10, Issue I, is as follows.

Stream Class	Interval
Class I	1 per 20 miles of road
Specific Class II	1 per mile of road
Other Class II	3 per mile of road

By the end of the proposal period the permanent road system would be essentially completed. Reconstruction of portions of the system could be required based on use and other factors. Resurfacing would take place as necessary.

1.6.1.2 Project Design Features

An Oregon Manual Supplement, Release 5-115 of April 10, 1975, would be used in preparing road construction requirements for timber sale contracts. All engineering terminology and types of construction equipment are defined. Specifications for all aspects of construction, reconstruction and surfacing are provided.

Methods of slope protection are provided to avoid collapse of cut and fill embankments. Specifications for rock pits and quarries include provisions for minimum visual intrusion, drainage and control of runoff and restoration following use.

One section of the manual supplement provides design features to control and minimize erosion during road construction and throughout the design life of the road. Another section addresses soil stabilization practices including planting, seeding, mulching and fertilization for establishment of soil binding vegetation.

1.6.2 Timber Harvest

Two-stage shelterwood harvest technique would be employed on both high intensity and low intensity lands. Clearcutting would be employed only on high intensity lands and then only on areas determined by the Operations Inventory to be suitable. Appendix A is illustrative of an annual timber sale plan which identifies, among other things, the harvest techniques to be employed.

1.6.2.1 Scope of Treatment

The regeneration cut of a shelterwood harvest would remove up to 60 percent of the original stand basal area. Maximum removal on south or west slopes would be 50 percent. An average of 3,600 acres of high intensity land would undergo a regeneration cut each year. For low intensity lands, the trial harvest would average 500 acres per year.

Approximately 2,250 acres undergoing regeneration cut each year would be new areas previously undisturbed by humans. The balance of regeneration cutting would be in areas having experienced some disruptive activity such as initial entry under the three-stage shelterwood system presently employed.

Previous observations of areas following initial entry under a three-stage shelterwood approach show that most mortality is attributable to damage suffered during logging. With two-stage shelterwood it is expected that damage would be lessened since the heavier regeneration cut allows more room in which to fell timber and operate equipment.

Natural mortality occurs in all timber stands. Shelterwood systems allow the removal of trees judged to be most susceptible to insects, disease or windthrow during the regeneration cut. Under the proposal it is estimated that one tree per acre per year would die between regeneration cut and the final harvest cut. One-third of the mortality would be due to windthrow following harvest in previously undisturbed stands.

No special salvage program is planned for high intensity lands since final harvest would take place as soon as the new stand is established. Average volume loss is estimated to be 10 board feet per acre per year due to deterioration of mortality timber prior to its salvage during final harvest cut.

Final harvest cut would take place after establishment of a new stand containing at least 300 commercial coniferous trees per acre, approximately 4 years for high intensity lands. Reforestation would be by planting following the regeneration cut. Reforestation of low intensity lands would be dependent on natural regeneration.

No final harvest cutting is anticipated on low intensity lands during the proposal period. For high intensity lands there would be 9,000 acres of final harvest cut, predominantly in the second half of the decade.

Clearcutting of high intensity lands would average 500 acres per year during the proposal period. Approximately half, or 250 acres per year, would be previously undisturbed areas.

1.6.2.2 Project Design Features

Harvest planning assures that sale area design meets the visual resource management class objectives for the vicinity. Harvest planning requirements regarding threatened and endangered species and cultural resources are as discussed in Section 1.6.

Oregon Manual Supplement 5424, Appendix 4a, lists special provisions or stipulations for use in the logging requirements portion of a timber sale contract. It is estimated that 77 percent of the proposed harvest in the JSYU would be accomplished by cable systems with tractors systems employed for the remainder. The availability of a variety of logging systems is a design feature primarily to reduce soil damage. Refer to the BLM Timber Management Final Environmental Statement (FES 76-49) for a detailed description of logging systems.

Logging provisions available for use in Section 41 of the timber sale contract provide for a wide variety of situations which may be encountered on a particular sale area. Advance notice to the BLM prior to beginning or cessation of operations is normally required. Timing of completion in a cutting area, height of stumps, maximum length of logs for yarding, and type of equipment to be used may be stipulated to reduce damage to the site and the remaining trees.

A group of special provisions is available to protect specific values. These may prohibit yarding through streams or specific areas. Locations for landings may be limited. Time of year or operating conditions, e.g. dry soil, may be specified.

1.6.3 Slash Disposal

Provision for disposal of slash -- unutilized logging residue -- is contained in most timber sale contracts. Determination of specific

requirements and extent of treatments to be employed is a function of planning for each specific sale.

1.6.3.1 Scope of Treatment

Burning

Acreages listed in Table 1-1 for proposed burning are net figures, representing the estimate of total burned area. In actuality, portions of all 55,000 acres on which harvest would take place during the proposal period may be burned.

Disposal by burning would take place on 1,000 acres of high intensity lands per year and only 10 acres of low intensity lands. There is a direct correlation between these figures and the prescription for reforestation in each class. Low intensity lands would be expected to reforest naturally so disposal of all slash is not a large issue. Burning would be confined to those areas where slash concentrations constitute a fire hazard.

Slash disposal on high intensity lands would need to be directed beyond the requirement of fire hazard reduction. Emphasis would have to be placed on making such lands accessible to planting crews and preparation of planting areas by reduction of competitive vegetation. Similarly, removal or concentration of large slash is implicit in the prescription. Otherwise, such material could be moved around by logging equipment during shelterwood final harvest and accidentally damage new plantations (see Gross Yarding).

Gross Yarding

Gross yarding may include several actions depending on the particular circumstances of the timber sale. Essentially, gross yarding requires removal of all material which the purchaser does not elect to take to the mill. The proposed minimum size is 8 inches in diameter and 8 feet long. Concentration points for such material are designated on landings, skid roads or other appropriate places. Material thus piled may be burned (included in estimate of acres for burning), resold after contract termination, or utilized by firewood cutters. The treatment is effective for both shelterwood and clearcut harvest techniques and applicable to both cable and tractor logging methods.

Machine Piling

Machine piling is employed on terrain suitable for tractor operations (side-slope less than 35 percent) to bunch slash preparatory to burning. Generally a brush blade is installed on the tractor in lieu of the standard bulldozer blade. These blades are fitted with teeth which minimize soil displacement and reduce amounts of soil in piles.

In areas of identified soil compaction, such as on landings and major skid roads, soil ripping to a depth of 15 to 20 inches may be required.

In sale areas containing intermingled areas of brush within the cutting area, mechanical scarification of such areas may be required. The discussion of mechanical scarification in Section 1.6.4.1 is pertinent.

An average of 3,000 and 350 acres per year, respectively, of high and low intensity lands would be treated by gross yarding including machine piling. These figures aggregate all the activities described above.

1.6.3.2 Project Design Features

Section 15 of Form 5450-3 is the standard provision for fire protection and slash disposal. Numerous special provisions are available for use in a contract. Included are provisions for hand or machine piling, gross yarding to specific diameters and lengths, special piling and burning along roads and disposal of slash in accordance with written instructions from BLM.

The written instructions (or slash plan) are prepared jointly by BLM and the Oregon State Department of Forestry (OSDF). The slash plan includes a provision that the purchaser must obtain a burning permit from OSDF prior to undertaking slash disposal. Burning is conducted in accordance with the Oregon Smoke Management Plan (see Section 1.8.3.2).

Through a recent agreement with the State Forester it is now possible for slash disposal on public lands to be supervised and performed by OSDF personnel.

1.6.4 Site Preparation

Site preparation improves the potential for plantation success by reducing competition for light, moisture, and soil nutrients prior to or at the time of reforestation. Site preparation makes it easier to plant an area where the timber has been harvested and gives tree seedlings a much improved chance for survival and rapid growth in the absence or near absence of competitors. Brush fields and poorly stocked plantations resulting from plantation failures require brush and hardwood control to bring these lands into full timber production.

1.6.4.1 Scope of Treatment

Herbicides

Herbicides are used principally to control grass, forbs, brush and non-commercial tree species.

Herbicides are applied aerially or by several ground methods. The method selected is dependent on costs, topography, limits of the equipment, kind and dispersion of target plants, potential environmental impacts and biological conditions.

Most of the herbicides proposed for use in the JSYU would be applied by helicopters equipped with positive shut-off spray systems to limit herbicides to the target areas. Helicopter application would be accomplished under contract through a competitive bidding processes.

Combinations of herbicide are used as recommended by knowlegeable scientists. Combinations permit a broader range of effectiveness when there is a range of target species beyond the capability of a single chemical.

Most formulas for the growing season applications of herbicide use a small amount of diesel oil to dilute the herbicide. The resulting solution is emulsified in water for spraying.

Growing season applications entail 0.5 to 1.0 gallons of diesel oil per acre and constitute approximately one-third of all herbicide usage.

For dormant season applications, diesel oil constitutes most of the spray solution, averaging 15 gallons of diesel oil per acre. Approximately two-thirds of all herbicide spraying is dormant season application according to recent western Oregon experience.

Herbicides, as single chemicals or in combination, would be used for high intensity lands site preparation at a rate averaging 3,350 acres per year. An estimated 1,000 acres of low intensity lands would be treated during the proposed trial period. Table 1-9 shows the chemicals, target species, and estimated acreage of herbicide use proposed for the JSYU during the 10-year period. Acreage by chemical combination remains to be determined. Following are brief descriptions of the chemicals which would be employed.

Silvex

Silvex (trade names--2,4,5-TP, Kuron, Weedone) is a selective herbicide used for site preparation, release, thinning conifers, and controlling poison oak in administrative sites by ground application. It is a phenoxy herbicide similar to 2,4,5-T or 2,4-D. However, it is potentially more damaging than 2,4,5-T to conifers when used as a release spray. It is normally applied at a rate of 2 to 3 pounds per acre.

2,4-D

2,4-D is a selective phenoxy herbicide used for site preparation, conifer release, thinning conifer plantations, control of noxious and poisonous plants, and maintenance of improvements. If properly used it will not damage conifers when applied aerially as a release spray. It is usually applied at a rate of 2 pounds per acre.

Roundup

Roundup appears to be an excellent replacement for silvex in deciduous Coast Range brush and to be particularly effective in multi-story alder-salmonberry stands. The chemical does not control evergreen brush and is not particularly useful on sclerophyll vegetation. Roundup may prove useful against herbaceous vegetation, as well as against certain deciduous species of brush. Roundup costs about three times as much as silvex. It appears to be more effective on the indicated target species.

Krenite

Krenite is a new herbicide registered in the State of Oregon for site preparation and release on forest lands. It is applied at a rate of 3 to 5 pounds per acre to control deciduous woody plants and certain noxious or poisonous weeds and to maintain improvements. It can be used for "trimming" by treating only those parts of the plant needing control. For instance, branches overhanging a right-of-way clearing can be sprayed without killing the entire tree. Other herbicides or treatment methods must still be used for site preparation in brush communities where evergreen shrubs require control because Krenite is not effective against evergreens.

Table 1-9

Estimated Ten-Year Utilization of Herbicides

Chemical	Site Preparation Estimated Acreage 1/	Stand Release Estimated Acreage 1/	Active Ingredient (pounds)	Target Species
Silvex	20,000	9,000	87,000	Tan Oak Canyon Live Oak Chinkapin Rhododendron
2,4,D	20,000	9,000	58,000	Madrone Hazel Ocean Spray Blackberry Ceanothus spp.
Roundup	5,000	1,000	3,000	Blackberry Alder Swordfern Brackenfern Vine Maple
Krenite	5,000	1,000	12,000	Alder Blackberry Vine Maple Wild Rose Thimbleberry Brackenfern
Atrazine	15,000	1,000	64,000	Grass
Dalapon	5,000	1,000	30,000	Annual Grasses Forb

1/ Chemicals are often used in combination, therefore totals shown here will not equate with treatment acreages of Table 1-1.

Atrazine

Atrazine (trade names--Aatrex 80w, Aatrex 4L, Atrazine 80w) is a selective herbicide used to release conifers from grass competition and to prepare grassy sites prior to planting. Application rates are usually 4 pounds of active ingredient per acre.

Dalapon

Dalapon (trade name--Dowpon M) is a selective herbicide used at rates of 4 to 6 pounds per acre to control certain grasses in site preparation and maintenance of improvements.

Mechanical Scarification

Mechanical scarification is piling and/or windrowing brush and is normally accomplished with brush blade equipped bulldozers. To be acceptable, these operations must be restricted to: (1) slopes generally less than 40 percent due to equipment limitations and serious erosion hazards attendant to bare, exposed soils; (2) dry soil conditions; and (3) suitable soils.

Approximately 160 acres of mechanical scarification are planned during the proposal period in addition to that scarification which may be accomplished through timber sale contract requirements.

1.6.4.2 Project Design Features

Only Federally registered pesticides may be used on public lands except as authorized by Section 24c, Public Law 92-516, The Federal Environmental Pesticide Control Act of 1972. Section 24c provides for State registration of certain pesticides for local needs within the State. Any pesticide proposal planned under a State registration must include a copy of the State label.

Specific projects for herbicide use in the JSYU are developed in the Medford District Office. Appendix B is illustrative of an annual herbicide plan. All projects are reviewed at BLM's Oregon State Office and then at the Denver Service Center of BLM (DSC). Many projects are approved at the DSC level. However, some which involve unusual situations or chemicals may be referred to the BLM Washington, D.C. Office, Division of Watershed Management, for review. Those not receiving approval at this level may be referred to the Department of the Interior for final resolution.

Proposed decisions of the Josephine Management Framework Plan (see Section 1.8.1) are very specific with regard to site preparation. They include prohibition of aerial spraying within 100 feet of perennial streams and prohibit treatment of an entire drainage within a short period of years. Limitations are placed on mechanical scarification based on soil, topography, and proximity to streams.

Timing of herbicide treatment is stringently controlled. Weather conditions, humidity and wind, are tightly specified. There is full authority for ordering cessation of operations based on adverse field conditions. Both equipment employed and equipment operators are frequently checked by field project supervisors.

Specific design features included in herbicide projects plans and contracts for application include the following considerations.

If endangered or threatened plant species are known or suspected to occur within the influence zone of the proposed action, an on-the-ground floristic inventory is made. The project would then be modified to protect such plants if they are found in the project area.

On herbicide application projects conducted directly by Bureau personnel, a licensed employee monitors and supervises the project. Work done by contractors will be carried out by individuals having proper State licenses.

Contractors may not wash out any spray tanks in or near any of the streams or dispose of any chemical containers on the contract area.

During aerial spraying, spray is turned off at the end of spray runs and during the time when a turn is being made.

Mixing and loading operations take place in areas where an accidental spill will not flow into a stream or body of water.

The following are minimum widths (measured horizontally) of unsprayed buffer strips for the herbicides listed in Table 1-9 when they are applied adjacent to waters which are valuable for domestic use, important for angling or other recreation, and/or used by significant numbers of fish for spawning, rearing or migration routes (Class I streams) perennial streams, other bodies of water, or marshy areas. Buffer strip widths for headwater streams and minor drainages (Class II streams) which are intermittent are discretionary.

a) Aerial Spraying	
Spraying Altitude (over ground)	Buffer Strip
30-45 feet	100 feet
b) Vehicle spraying	25 feet
c) Hand application	10 feet

To minimize drift and volatilization, aerial spraying would utilize low volatile ester formulations and be confined to periods when wind speed is less than 6 miles per hour, air temperature is under 70 degrees, relative humidity is over 50 percent, vegetation is free of snow or ice, precipitation is not occurring or imminent, and air turbulence will not affect normal spray patterns. Label directions will be followed if additional restrictions are required.

Frequent measurements of weather conditions would be made by trained personnel at spray sites during application. Additional measurements are made anytime it appears that a weather change may be taking place that could jeopardize safe placement of the spray on the target area.

Helicopters normally fly at an airspeed of 40 to 50 miles per hour at 30 to 45 feet above the vegetation. Spray pressure in the boom will be 25 to 35 pounds per square inch. Minimum drift reduction with normal spray formulations and conventional application equipment is obtained by

using D8 jet nozzles (8/64 inch diameter orifice) directed back along the airstream (Stewart 1976). All aerial nozzles are equipped with automatic shutoff devices to prevent loss of herbicide along nonspray flight routes.

A water monitoring program is carried out by the Bureau as part of the spray project. The purpose is to determine the effectiveness of buffer strips, and administrative controls in protecting water quality and the aquatic environment. Water monitoring is done when any herbicide application is in a municipal watershed, in a fish hatchery supply watershed, in a watershed with a domestic water supply intake for drinking or irrigation less than 1 mile downstream from the treatment area, or where a herbicide application is adjacent to or the treatment area includes a major fish bearing stream.

Water monitoring of streams begins prior to herbicide application to identify the normal level of water quality. Stream samples are systematically taken for intervals up to 10 days following spraying.

Water would be analyzed for all common herbicides (including 2,4,5-T and Amitrole T, which might be used on non-BLM lands). The sampling plan for streams and water bodies in sprayed areas would be as follows:

1) Prior to spraying for control purposes.
2) Immediately after spraying.
3) One day after spraying.
4) After each of the first two storm events.
5) Autumn leaf fall.
6) Following year (if 4 or 5 are negative, monitoring would be discontinued at that point).

Timing of the collection of sample number 2 depends on the distance between the lower spray unit boundary and the sampling point. If this point is immediately below the unit, sample 2 should be taken as described. If the sampling point is downstream some distance below the unit, collection of sample 2 must be delayed to correlate with the flow duration from the time of spraying.

Additional information on the sampling plan for herbicide residues is in Appendix F.

1.6.5 Planting

1.6.5.1 Scope of Treatment

To achieve adequate reforestation within the assumed 4 years following timber sale, harvested areas would be seeded or planted with commercial coniferous species within 1 year of the completion of the timber sale contract. Planting stock is nursery grown from seed collected on sites and at elevations similar to the specific project area.

Douglas-fir is the predominant species planted in the northern half of the JSYU and also at elevations above 2,700 feet in the southern half of the unit. Below 2,700 feet in the southern half, the anticipated species mix for planting is Douglas-fir, 70 percent; ponderosa pine, 20 percent; and sugar pine, 10 percent.

The proposal calls for planting all the high intensity lands undergoing shelterwood regeneration cut or clearcut. The total planting area would average 4,100 acres per year.

During the first 5 years of the proposal, about half of the seedlings used would be 2-year-old stock (2-0 bareroot). The other half would be 1-year-old seedlings grown in containers. Planting of containerized seedlings minimizes root disturbance and transplant shock. In the latter half of the proposal period, the ratio would be expected to shift toward a 60/40 distribution between bareroot and containerized planting stock.

More than 9,000 acres of high intensity lands are presently nonstocked or understocked (minimum acceptable stocking ranges from 245-320 seedlings per acre). Adequate reforestation of backlog acreage is an important aspect of the proposal. Project areas in this category would generally require site preparation prior to planting. Containerized stock is expected to be used more often for reforestation of backlog acreage since these are often problem areas.

Reforestation experience in the JSYU shows that adequate stocking cannot always be achieved by the initial planting. An estimated 12,300 acres would require replanting or interplanting during the proposal period.

Loss of seedlings during shelterwood final harvest cut is expected to be moderate. Final harvest would not take place until adequate stocking is achieved. Normally, the underplanted population would exceed 300 trees per acre. Nevertheless, interplanting following final harvest has been considered in generating the 12,300-acre figure for replanting.

1.6.5.2 Project Design Features

Primary project design features associated with planting address care of stock prior to planting and methods of tree placement. Each planting area is sampled for adequacy of spacing. Contract penalty clauses are directly tied to quality of planting.

Post-treatment surveys are conducted to determine rate of survival. If inadequate, replanting or interplanting may be undertaken.

1.6.6 Herbicide Release

Release is the reduction of competition for light, moisture, and nutrients between shrubs or grass and existing commercial coniferous seedlings. Fast-growing trees, such as red alder or vine maple, overtop and suppress slow-starting conifer seedlings. The degree and type of competition varies with the individual site. On dry sites, grass competes effectively for water, while elsewhere hardwoods grow rapidly enough to shut out essential light and compete for water during the dry summer. In recent years, herbicides have been used effectively to inhibit the growth of competing vegetation, thus increasing available water, nutrients, and light for suppressed conifers.

1.6.6.1 Scope of Treatment

With reduced competition, the conifers rapidly grow beyond the point where they can be overtopped and further suppressed by surrounding vegetation. When this growth situation is achieved, there would be no further control of competing vegetation. Herbicide release spraying is proposed for an average of 1,320 acres per year of high intensity lands. (Table 1-9 lists the chemicals to be employed.) Discussion of specific herbicides in Section 1.6.4 is also applicable to release spraying.

1.6.6.2 Project Design Features

Project design features are the same as for site preparation using herbicides.

1.6.7 Precommercial Thinning

Precommercial thinning would be applied to stands approximately 15 years of age which have too many trees (commercial forest species). Trees would be 10 to 30 feet in height at that age. This treatment concentrates available nutrients, moisture and light into those trees which would be the eventual crop for the next harvest.

1.6.7.1 Scope of Treatment

The number of well-spaced trees per acres after precommercial thinning is dependent on the biological productivity of the area and tempered by plans to conduct commercial thinning later. While average spacing is approximately 12 feet by 12 feet, the number of crop trees left may vary between 245 and 320 per acre. Least productive sites will be thinned more heavily since commercial thinning at a later time is less likely. Precommercial thinning is planned on an average of 1,420 acres per year.

1.6.7.2 Project Design Features

Contract specifications or field instructions to BLM crews cover desired spacing of crop trees and criteria of crop tree selection. Seldom are crop trees individually marked although this may be the approach when dealing with a new contractor or crew.

1.6.8 Fertilization

Fertilization is planned for areas that undergo thinning. Detailed on-site soil analysis would be employed to determine composition of fertilizer needed, rate of application, and timing between applications. Average application is expected to be 200 pounds of nitrogen per acre at 10-year intervals.

In addition to acceleration of growth for up to 7 years following fertilization, the treatment tends to reduce shock associated with thinning.

Approximately 18,900 acres would be fertilized during the proposal period. Fertilizer would not be applied within 100 feet of perennial streams.

1.6.9 Commercial Thinning

Stands ranging in age from 30 to 70 years would be commercially thinned under terms of timber sale contracts at 20-year intervals to maximize the production of forest products. At the first thinning the

crop trees would be 9 to 11 inches in diameter. In the process, suppressed intermediate and some codominant trees will be sold and removed. Timing of thinning would be dictated by degree of crown closure and growth rate, with reduced growth rate being a primary indicator. Following one or more commercial thinnings, the final crop at age 70 would consist of 200 to 225 trees per acre.

Nearly 5,000 acres would be scheduled for commercial thinning in the 10-year plan. See Section 1.6.2. for a discussion of design features of a timber sale contract.

1.7 MONITORING AND RESEARCH

1.7.1 Monitoring

The Bureau of Land Management monitors land management practices primarily through administration of the contracts under which most actions are authorized. Evaluations of field operations are conducted periodically to assure that all aspects of policy and procedure are adhered to and an acceptable level of compliance is attained.

Timber management planning is monitoring since it regularly takes place at least every 10 years. Each successive recomputation of allowable harvest is based on newly acquired inventory data. Often, due to technological advances in the science of forest measurement, the procedure varies from one computation to the next. Nevertheless, baseline is established by the previous computation and the new data are comparable.

Monitoring of environmental components is accomplished by numerous Federal, State, and local agencies. For instance, water quality within or adjacent to the JSYU is monitored by the U.S. Geological Survey, Oregon Department of Environmental Quality, U.S. Army Corps of Engineers, and the Environmental Protection Agency. In the EPA program, BLM is a cooperator, with Bureau personnel gathering some of the samples.

Air quality is monitored, primarily in urban areas, by ODEQ. In the JSYU, the only air quality monitoring station is in Grants Pass. Slash burning is conducted only when smoke dispersal conditions, as determined by the Oregon State Department of Forestry, are adequate to meet criteria of their Smoke Management Plan.

Site specific inventories constitute monitoring. Intensive soil surveys, specific area terrestrial and aquatic wildlife inventories, cultural resources survey, and endangered species survey are in this category. Surveys of this nature may be conducted as a preparatory step in the planning of a particular timber sale or forest development project.

1.7.2 Research

BLM is not a direct research agency and does not employ scientists whose primary duties are to conduct research. Research needs are identified by managers and resource specialists who recognize problems relating to resource management. Proposals for research are prepared and the work is contracted to agencies, institutions or companies equipped and prepared to do the problem resolution. Often a research organization is interested in the same or similar problem and the investigation is jointly funded.

BLM's cooperative research program is evaluated periodically with new projects added or thrusts changed in on-going investigations as may be necessary in light of the latest management requirements. Several current research projects are expected to result in findings which will benefit management in the JSYU. Research in the following categories is now underway.

Project	Expected Completion Date	Research Organization
Log Grade and End Product Research	Indefinite	Pacific Northwest Forest and Range Experiment Station
Effects of Soil, Compaction on Growth	1979	Oregon State University
Development of Rust Resistant Pines	Indefinite	Forest Service-Region 6
Forest Fertilization	1983	University of Washington
Pollen Storage Study	1979	Oregon State University
Hybridization of Genus <u>Pseudotsuga</u>	Indefinite	Oregon State University
Reforestation in SW Oregon	1981	Pacific Northwest Forest and Range Experiment Station
Determination of Physiological Quality of Planting Stock	1979	Oregon State University
Evaluation of Survival Potential of Douglas-fir Under Drought Stress	1988	Oregon State University
Development of Guidelines for Improved Nursery Stock	1980	Pacific Northwest Forest & Range Experiment Station

A new and ambitious forest research program has been developed. It is entitled Forestry Intensified Research (FIR) and is a cooperative effort of forest management agencies, forest research institutions and timber industry companies and associations in southwestern Oregon.

The program prospectus was prepared by representatives of the Medford District of the Bureau of Land Management, the Rogue River National Forest, the Medford District of the Oregon State Department of Forestry, the Oregon State Forest Research Laboratory, the Pacific Northwest Forest & Range Experiment Station and the forest industry. Some basic points established by unanimous concurrence of all interested parties are relevant.

1) Southwest Oregon is an area unique in climate, geographic relationships, forest ecology and vegetative types. Therefore, it is also unique in forest management problems and opportunities.

2) Basic forest research information must be adapted to and tested for southwest Oregon conditions, and current research program funding does not permit adequate attention to southwest Oregon forest management needs.

3) There is a lack of adequate site-specific forest management knowledge for southwest Oregon conditions in the areas of reforestation, brush control, shelterwood cutting and soil relationships.

4) The forest area in Douglas, Jackson, and Josephine Counties has in recent years been producing about 2 billion board feet of timber per year, with average stumpage value in excess of $235 million per year. The importance of the economic and social values to the dependent communities in the southwest Oregon area makes a strong case for improved research programs to maintain these essential values.

The drafters of FIR program conclude that much greater forest research effort is essential in the southwest Oregon area. The objective would be approached through a major, integrated, program phased over a 10-year period. Responsibility for the program would be shared by Pacific Northwest Forest & Range Experiment Station (PNW) and the Oregon State Forest Research laboratory (FRL), with PNW the lead agency.

A dual approach is proposed. An "Adaptive Research and Information Transfer" phase would be established under direct leadership of the FRL with target date in Fall of 1978. The second phase, "Fundamental Research," would be administered by PNW and integrated with the initial "Adaptive Research" phase.

The research objective would be reached by pursuing four facets incorporated in this program:

1) Local adaptive research, integrated with (2) and with regional research elsewhere.

2) Fundamental research on priority problems.

3) Better information sharing between researcher-forester and forester-forester.

4) Local tests of new, integrative practices; practices derived from synthesis of results of logging, soils, regenerations, etc. research; large scale, operational tests and demonstrations of these practices.

1.8 INTERRELATIONSHIPS WITH OTHER PROGRAMS

This section discusses two kinds of relationships: those between the BLM timber management plan and other BLM plans and programs; and those between the BLM timber management plan and related plans and programs of other parties.

1.8.1 Application of the Bureau Planning System to Proposed Decisions in JSYU

The following is a discussion of the planning process which resulted in the proposed decisions of the Josephine Management Framework Plan. These proposals were reviewed at public meetings in late July of 1977 and written comments solicited. Final decisions cannot be made until 30 days after the final environmental statement has been filed with the Environmental Protection Agency (EPA).

The public lands within JSYU were inventoried and classified in accordance with the TPCC, OI, and reinventory (Section 1.4.1.1). Based on the results of the inventories, individual stands, or groups of stands, as delineated on TPCC-OI, were placed into one of three management classes described below.

High Intensity Lands -- Those lands which meet all of the TPCC criteria (Section 1.4.1.1), including the requirement for regeneration within 5 years and which form the land base on which the allowable cut is computed. The TPCC identifies 229,310 acres of high intensity lands in the JSYU (Table 1-3).

Low Intensity Lands -- Those lands which meet the criteria for long range sustained yield timber production except for the requirement that they be restocked within 5 years of a clearcut or regeneration cut of a partial cut regime. Such lands are not included in the allowable cut base. However, based upon Operations Inventory and data gathered during the reinventory, it is concluded that these lands can be regenerated, but during a period somewhat in excess of 5 years. To gather information from which to define the longer timeframe, a trial harvest and management program is proposed on this category of lands. There are 55,675 acres in this category.

Limited Management Lands -- These lands do not meet the TPCC criteria for inclusion in the allowable cut base, and further, are not suitable for inclusion in the Low Intensity category because of the likelihood of site degradation upon harvesting. No scheduled timber harvest is proposed from the 79,471 acres in this category. A major portion of these lands presently supports mature timber. Since no scheduled harvests are proposed on these lands, these stands of mature timber are available to be managed or preserved for various non-timber production purposes, such as habitat for old-growth dependent wildlife species, scenic values, etc. (Table 1-5).

The inventory and classification processes described above are the means by which a land base suitable for timber production is identified and opportunities for maximizing timber production on these lands are enumerated. During this process, a similar and parallel process was under way for each of the other resources found on the Josephine SYU.

Other inventories were conducted to identify and categorize specific resource capability and potential. Based on these other data, potentially implementable programs for protecting and maximizing production of each of the resources, independent of any conflicts and interactions among resources, were discussed and shown graphically on maps and overlays.

After identifying resources and opportunities, BLM resource specialists are asked to make realistic recommendations to maximize their particular resource. Recommendations inevitably conflict on occasion. The identification and - where feasible - resolution of these conflicts is the heart of the BLM land-use allocation process. Complete resolution of many conflicts is not always possible. Nevertheless, conflicts should still be identified through the Bureau planning system.

There are many possible alternative solutions to the land use conflicts. To emphasize the variety and the trade-offs involved, two land use alternatives, one maximizing the timber production, the other emphasizing other resources were developed as follows:

1. If all identified conflicts involving timber management were resolved in favor of maximizing long-term timber production, the annual allowable cut would be 95 MM bd. ft. Scribner.

2. If all identified conflicts involving timber management were resolved in favor of the non-timber resources, the annual allowable cut would be 63 MM bd. ft. Scribner.

These two theoretically implementable land-use alternatives and their attendant allowable cut levels represent the extreme ends of a spectrum within which lie all reasonable alternative land-use mixes. Within these extremes, it is possible to portray both the impacts on timber production and related economic elements, and the impacts in terms of non-timber amenities and economic elements foregone for any possible land-use alternative. The Medford District utilized this capability during the conflict analysis stage of their MFP process. Numerous alternative solutions to individual conflicts were considered prior to formulating the proposed action. These considerations are documented in the proposed MFP and were available for public review.

Those MFP issues on which the proposed MFP decisions significantly affected the selection of the proposed action are shown in Tables 1-10 and 1-11. The two alternatives representing opposite ends of the alternative spectrum are displayed in these tables. This display is intended to serve two major functions:

-- It accurately places the proposed action on the spectrum between a land-use alternative calling for maximum timber production and a land-use alternative maximizing non-timber benefits.

-- It gives the reader a measure of the sensitivity of various environmental and economic components to changes in land use, thus allowing at least a preliminary evaluation of possible deviations from the proposed land use allocations.

When final MFP decisions are made sometime following issuance of the final environmental statement, they will form the management guidelines within which specific action plans are formulated. Annual or multi-year timber harvest, reforestation, herbicide, and other forest practice plans will be developed consistent with the approved management prescriptions. Similarly, actions for other resources, e.g., habitat management plans, will be formulated within the MFP guidelines.

High Intensity Forest Management Lands

The following sets of tables display the array of issues which were addressed in the Josephine Management Framework Plan for the high intensity category of commercial forest land. Table 1-10 shows resolution of resource conflicts which reduced the land area allocated to high intensity timber production. Table 1-11 shows resource use considerations which constrain timber management on the 222,058 acres that are allocated to high intensity timber production. Table 1-12 shows proposals for enhancement of non-timber resource values which were not adopted.

In each table, a brief rationale for the proposed decision is given. The proposed Josephine MFP is available for review in the Medford District Office.

Table 1-10

Proposed Decisions Allocating Commercial Forest Land to Use other than Timber Management

ISSUE I: STREAM BUFFERS; The effects of streamside timber harvest on Wildlife, Fishery, Water Quality, and Recreation values.

A fisheries recommendation is to leave a 200 ft. undisturbed buffer on both sides of all Class I streams and a 50 ft. buffer on those Class II streams known to support native trout populations.

A recreation recommendation calls for a 200 ft. undisturbed buffer next to those Class I streams used for fishing and collecting.

A watershed recommendation calls for a 100-200 ft. undisturbed buffer on each side of major perennial streams, a 20-50 ft. buffer along minor perennial streams and a 10-30 ft. buffer next to important intermittent streams.

A wildlife recommendation is to maintain a 200 ft. undisturbed buffer along each side of Class I streams.

Alternatives Considered

	Maximum Timber Production	Maximum Recommended Protection of other Resources	Proposed Decision
A. Characteristics of the Alternative			
1. Class I Streams			
a. Buffer Width	0	200 ft.	100 ft. (average)
b. Buffer Type		No harvest	Salvage of dead timber
2. Selected Class II Streams			
a. Buffer Width	0	50 ft.	50 ft. (average)
b. Buffer Type		No harvest	Protective Shelterwood
3. Other Class II Streams			
a. Buffer Width	0	20 ft.	0
b. Buffer Type		No harvest	Harvest commercial species; maintain stream shade by preserving other vegetation; no felling or yarding through stream
B. Effects			
1. Timber			
a. Reduction in land allocated to timber management	0	13,400 Ac (Class I & II Streams)	1,600 Ac (Class I streams only)
b. Reduction in annual timber harvest	0	1144.04 cu.ft. (5835 M bd. ft.) (Class I & II Streams)	146.64 M cu. ft. (748 M bd. ft.) (Class I & II Streams)
c. Reduction in annual local personal income	0	Approximately $1,100,000	Approximately $140,000
d. Loss of job opportunities	0	Approximately 100	Approximately 13
2. Fisheries			
a. Effect on cold-water fisheries in Class I streams	Converted to warmwater, non-game fish species	Maintained or enhanced	Retained with no measurable loss
b. Effect on trout fisheries in Class II streams	Eliminated	Maintained or enhanced	Maintained
c. Reduction in annual personal income attributable to commercial & recreational fishing	Approximately $700,000	0	0
d. Loss of job opportunities	Approximately 90	0	0

Table 1-10 (Continued)

	Maximum Timber Production	Maximum Recommended Protection of Other Resources	Proposed Decision
3. Riparian zone wildlife habitat			
a. Effect on productivity	Seriously depleted	Preserved	Reasonably maintained
b. Reduction in annual personal income attributable to hunting	Approximately $1,100	0	0
4. Recreation (other than hunting and fishing)			
a. Effect on landscape	Disturbed	Preserved	Reasonably maintained
b. Reduction in annual personal income	Approximately $1,000	0	0
5. Effect on water quality, as compared with existing quality	Considerable degradation	Improved	Maintained
6. Total economic effects			
a. Reduction in annual personal income	Approximately $702,100	Approximately $1,100,000	Approximately $140,000
b. Loss of job opportunities	Approximately 90	Approximately 100	Approximately 13

Rationale of Proposed Decision:

Buffer strips as proposed provide reasonable protection to other resources while maintaining emphasis on timber management. Harvest is allowed in accordance with criteria wherein stream protection is the dominant consideration. Stream classification is the prime determinant in setting level of harvest which may be allowed within a buffer. Minimum adverse economic effect is attained with the proposed allocation.

Stream buffer widths may be greater or less than those proposed and will vary according to the terrain, e.g., unusually steep topography may result in a narrower buffer while unusually moderate topography may result in much wider stream buffer than indicated under the proposed decision.

Table 1-10 (Continued)

ISSUE II: VRM CLASS II LANDS; Pertains to implementation of Visual Resource Management Class II objectives (see Appendix G).

The VRM recommendation for Class II lands is that vegetation manipulation projects be designed to repeat features of a natural landscape so as to not be obvious to the casual observer. There are approximately 32,000 acres within the JSYU identified as Class II. Approximately 3,000 acres are high intensity timber management lands and fall within the visual foreground when viewed from the Rogue Wild River (1,300 acres) or major highways (1,700 acres).

A wildlife recommendation calls for prohibition of disruptive activities in the vicinity of crucial wildlife habitat areas and noted the Rogue Wild River area as critical habitat for bear and cougar.

	Alternatives Considered		
	Maximum Timber Production	Maximum Recommended Protection of Visual Resources	Proposed Decision
A. Characteristics of the Alternative			
1. Land Allocation	3,000 acres for high intensity timber management.	No acres removed from timber production base.	Reclassify 1,300 acres adjacent to Rogue Wild & Scenic River to VRM Class I.
2. Harvest Practices	Clearcut or 2-stage shelterwood.	Protective shelterwood harvest.	1,300 acres no harvest 1,700 acres protective shelterwood.
B. Effects			
1. Timber			
a. Reduction in annual harvest	0	38.43 M cu.ft.	123.33 M cu.ft. (629 M bd.ft.)
b. Reduction in annual local personal income	0	Approx. $37,000	Approx. $118,000
c. Loss of job opportunities	0	Approx. 3	Approx. 11
2. Visual Resources Ability to meet Class II objectives	Serious conflicts, harvested sites would dominate the landscape	Harvested areas not obvious to casual observer	Meets objectives along highways; exceeds Class II objectives along Rogue Wild River
3. Wildlife Habitat	No protection of old-growth timber habitat type.	No old-growth habitat preserved.	Bear and cougar habitat preserved.

Rationale of Proposed Decision;

Reclassification of visual foreground outside Rogue Wild River corridor to VRM Class I maintains the pristine nature of the river environment since no harvest is permitted from VRM Class I lands. Old growth timber habitat type is provided for bear and cougar. The proposed reduction in annual timber harvest of 123.33 M cu.ft. is warranted to protect the visual resources.

Visual foreground visible from major highways is protected by use of protective shelterwood harvest technique at a minimum cost to timber production capability. With careful planning timber sales can be laid out and harvested in Class II visual background without creating a visual intrusion.

Table 1-10 (Continued)

ISSUE III: THREATENED OR ENDANGERED SPECIES; The effects of timber harvest on threatened or endangered animals or plants.

A wildlife recommendation is to manage for six pair of northern spotted owls (Threatened, ODFW) in accordance with management guidelines set forth in Oregon Instruction Memo 78-74 (see Section 3.2.4.1 for more detail). This is a total management area of 6,741 acres of which 873 acres is high intensity lands removed from the base.

A recreation recommendation calls for the preservation of unusual plant communities containing threatened or endangered plants such as the pitcher-plant and chain fern. Approximately 250 acres of high intensity lands are involved.

	Alternatives Considered		
	Maximum Timber Production	Maximum Recommended Protection of Other Resources	Proposed Decision
A. Characteristics of the Alternative			
1. Spotted Owl Nest Sites			
a. Land Allocation	873 acres for high intensity timber management	873 acres removed from timber production base	873 acres removed from timber production base
b. Harvest Practices	Clearcut or 2-stage shelterwood	No harvest	No harvest
2. Botanical Sightseeing Areas			
a. Land Allocation	250 acres for high intensity timber management	250 acres removed from timber production base	250 acres removed from timber production base
b. Harvest Practices	Clearcut or 2-stage shelterwood	No harvest	No harvest
B. Effects			
1. Timber			
a. Reduction in land allocated to timber mgmt.	None	1,123 acres	1,123 acres
b. Reduction in annual timber harvest	None	98.64 M cu.ft. (503 M bd.ft.)	98.64 M cu.ft. (503 M bd.ft.)
c. Reduction in annual local personal income	None	Approx. $56,000	Approx. $56,000
d. Loss of job opportunities	No loss	Approximately 9	Approximately 9
2. Wildlife	Possible loss of all spotted owls on high intensity lands	Preserves 873 acres of old-growth habitat necessary for spotted owl nesting.	Preserves 873 acres of old-growth habitat necessary for spotted owl nesting.
3. Recreation	Reduce or eliminate unusual plant communities containing threatened or endangered species.	Preserve 250 acres of commercial forest land containing unusual plant communities and designated as botancial sightseeing areas.	Preserve 250 acres of commercial forest land containing unusual plant communities and designated as botanical sightseeing areas.

Rationale of Proposed Decision:

The Northern spotted owl require stands of old-growth timber to nest and raise their offspring. The BLM is a party to a management agreement with USFS, USFWS and ODFW. The removal of 873 acres from the timber production base coupled with adjacent lands will meet BLM's obligation for management of this species in the JSYU. The annual timber harvest will be reduced by 77.39 M cu.ft.

Approximately 2,080 acres have been identified as having unique botanical values in the Josephine SYU (250 acres of which are classified as high intensity land). The proposed decision of withdrawing these 250 acres and reducing the annual timber harvest by 21.25 M cu.ft. is warranted to protect the threatened or endangered plant species contained therein.

Table 1-11

Resource Use Restraints on Lands Allocated to Timber Production

ISSUE I: POTENTIAL RECREATION SITES; The effects of timber management activities on sites having the potential for recreation development.

A recreation recommendation calls for a study to re-evaluate inventoried potential campgrounds and/or picnic sites and to determine whether their continued protection is required. Total acreage recommended for study includes 1,300 acres of high intensity land.

	Alternatives Considered		
	Maximum Timber Production	Maximum Recommended Protection of Other Resources	Proposed Decision
A. Characteristics of the Alternative			
1. Timber Harvest	Harvest 1,300 acres identified as having recreation site potential.	Leave land in timber production, but do not harvest on 1,300 acres pending detailed re-evaluation of each potential site.	Leave land in timber production base, but do not harvest on 1,300 acres pending detailed re-evaluation of each potential site.
B. Effects			
1. Timber			
a. Reduction in land allocated to timber management.	None	1,300 acres (temporarily)	1,300 acres (temporarily)
b. Reduction in annual timber harvest.	None	None	None
c. Reduction in annual local personal income.	None	None	None
d. Loss of job opportunities	No loss	No loss	No loss
2. Recreation Site Quality	Severely diminished	Maintained until re-evaluations have been completed	Maintained until re-evaluations have been completed.
3. Wildlife	No old-growth timber preserved.	1,300 acres of old-growth timber preserved pending re-evaluation studies.	1,300 acres of old-growth timber preserved pending re-evaluation studies.

Rationale of Proposed Decision:

The proposed decision to delay harvest on 1,300 acres of potential recreation sites will preserve the quality of these areas until a review can be made. After the study has been completed the timber production land base can be adjusted to exclude those lands found to be appropriate for eventual recreation site development.

Table 1-11 (Continued)

ISSUE II: ELK WINTER RANGE; The effects of timber management activities on areas crucial to elk survival during the winter months.

A wildlife recommendation is to schedule harvest operations so that 25 to 40 percent of the crucial elk winter range (approx. 5,000 acres) will be maintained in a closed canopy condition with cover at least 50 feet high.

	Alternatives Considered		
	Maximum Timber production	Recommended Maximum Protection of Elk Winter Range	Proposed Decision
A. Characteristics of the Alternative			
1. Timber harvest	Harvest without regard to impact on elk winter range.	Maintain 25-40% of crucial elk winter range in a closed canopy condition with trees at least 50 feet high.	Harvest within elk winter ranges. Stagger cutting units to provide 25-40% in a closed canopy condition with trees at least 50 feet high.
B. Effects			
1. Timber			
a. Reduction in land allocated to timber management.	None	None	None
b. Reduction in annual timber harvest	None	64.12 M.cu.ft. (327 M.bd.ft.)	None
c. Reduction in annual local personal income	None	Approx. $61,000	None
d. Loss of Job opportunities	No loss	Approx. 6	No loss
2. Wildlife			
a. Elk population	Probable decrease due to accelerated harvest of old-growth timber.	Probable increase since closed canopy habitat would be increased	Should be maintained

Rationale of Proposed Decision:

Elk need areas on the winter range which have reduced snow depths for feeding and protection. The proposed decision to stagger cutting units will provide closed canopy conditions to supply this need and will also provide thermal cover.

Table 1-11 (Continued)

ISSUE III: VRM CLASS III LANDS; The effects of timber harvest on areas identified as Visual Resource Management (VRM) Class III lands.

A VRM recommendation is that, although timber management activities may be visible on areas possessing average scenic qualities, they should not become a dominant feature on such areas.

	Alternatives Considered		
	Maximum Timber Production	Maximum Recommended Protection Of Visual Resources	Proposed Decision
A. Characteristics of the Alternative			
1. Timber Harvest	Harvest 30,000 acres of VRM Class III lands	Accomplish vegetative manipulations on VRM Class III lands in such a manner that they are not dominant features on the landscape.	Harvest 30,000 acres of VRM Class III Lands using techniques, such as limiting the size of units to 40 acres and irregular boundaries, which will prevent harvested areas from becoming a dominant feature on the landscape.
B. Effects			
1. Timber			
a. Reduction in land allocated to timber management.	None	None	None
b. Reduction in annual timber harvest.	None	None	None
c. Reduction in annual local personal income	None	None	None
d. Loss of job opportunities	No loss	No loss	No loss
2. Landscape	Harvested areas would dominate landscape.	Harvested areas would not dominate landscape.	Harvested areas would not dominate landscape.

Rationale of Proposed Decision:

In order to preserve the scenic quality of VRM Class III lands, management actions should not be a dominant feature and the shapes, colors, lines, etc of activities should be complementary to the existing landscape.

The proposed decision to use harvest techniques such as limiting the size of units to 40 acres with irregular boundaries, so that the scenic quality of these lands will not be significantly affected, will not have adverse economic impacts.

Table 1-11 (Continued)

ISSUE IV: ROGUE "WILD" RIVER; The effects of timber harvest on the wild segment of the Rogue River.

A recreation recommendation is that audible intrusions from timber harvesting beyond the visual foreground of the Rogue "Wild" River should be prohibited during the summer season (June 12 to September 12).

	Alternatives Considered		
	Maximum Timber Production	Maximum Recommended Protection of Rogue "Wild" River Corridor	Proposed Decision
A. Characteristics of the Alternative			
1. Timber Harvest	Harvest throughout the year, disregarding audible intrusions.	No harvest between June 12 and September 12, resulting in a 40 per cent reduction in average harvesting season.	Harvest throughout the year.
B. Effects			
a. Reduction in annual harvest	None	None	None
b. Reduction in annual local personal income	None	None	None
c. Loss of job opportunities	No loss	No loss	No loss
2. Rogue "Wild" River Environment.	Constant audible intrusions associated with timber harvest.	No audible intrusions during June 12 - September 12.	Some audible intrusions during summer months.

Rationale of Proposed Decision:

Timber harvest operations will cause audible intrusions but will not substantially interfere with public use and enjoyment of the values for which the river was designated. Timber harvest with its associated noise occurred on Federal lands in proximity to the Rogue River Corridor prior to the designation of the Rogue as a National Wild and Scenic River.

Table 1-11 (Continued)

ISSUE V: STREAM BUFFERS - Herbicide Treatment, Fertilization and Other Intensive Practices; The effects of using chemical herbicides and fertilizers and employing other intensive forestry practices in the vicinity of streams.

A water quality recommendation is to maintain a 200 foot no-spray and no-fertilize buffer on each side of all Class I and Class II streams.

A wildlife recommendation calls for the maintenance of an undisturbed buffer strip of 200 feet on each side of Class I streams and 50 feet on each side of Class II streams by prohibiting all intensive forestry practices in these areas.

	Alternatives Considered: Maximum Timber Production	Alternatives Considered: Maximum Protection of other Resources	Proposed Decision
A. Characteristics of the Alternative			
1. Size and Location of Stream Buffers			
a. Application of chemical herbicides and fertilizers	No stream buffers	200 feet-All perennial streams	100 feet-All perennial streams.
b. Mechanical site preparation and control burning	No stream buffers	200 feet-Class I streams 50 feet-Important Class II streams 25 feet-Other streams	100 feet-Class I streams 50 feet-Important Class II streams 20 feet-Other Class II streams
c. Precommercial and commercial thinning	No stream buffers	200 feet-Class I streams 50 feet-Important Class II streams 20 feet-other streams	100 feet-Class I streams
B. Effects			
1. Timber			
a. Reduction in annual timber harvest	None	117.25 M.cu.ft. (598 M.bd. ft)	None*
b. Reduction in annual local personal income	None	Approx. $112,000	None*
c. Loss of job opportunities	None	Approx. 10	None*
2. Fisheries	Considerable losses	No adverse effect.	Minimal effect.
3. Water Quality	Considerable degradation	Improved	Maintained

Rationale of Proposed Decision:

The proposed decision to provide stream buffers of various widths (depending on stream class and the type of intensive management practice being conducted) will sufficiently protect the streams and riparian habitat.

* No additional effects. Buffer strips removed from allowable cut base (see Table 1-10, Issue I).

Table 1-11 (Continued)

ISSUE VI: HERBICIDE TREATMENT ON VRM CLASS II AND CLASS III LANDS; The effect of using chemical herbicides for site preparation of Visual Resource Management Class II and Class III Lands.

VRM recommendation is that vegetative manipulations on VRM Class II land not be obvious to the casual observer and that vegetative manipulation on VRM Class III land not be a dominant feature of the landscape.

	Alternatives Considered		
	Maximum Timber Production	Maximum Recommended Protection of Visual Resources	Proposed Decision
A. Characteristics of the Alternative			
1. Application of chemical herbicides	Unrestricted use of chemical herbicides on 33,000 acres of VRM Class II and Class III lands	Spray 33,000 acres of VRM Class II and Class III lands using techniques such as laying out project boundaries so they are irregular in shape and blend in with the natural countours of the landscape.	Spray 33,000 acres of VRM Class II and Class III lands using techniques such as laying out project boundaries so they are irregular in shape and blend in with the natural countours of the landscape.
B. Effects			
1. Timber			
a. Reduction in annual timber harvest	None	Minor	None
b. Reduction in annual local personal income	None	Modest	None
c. Loss of job opportunities	No loss	Minor	No loss
2. Landscape	Treated areas would dominate landscape	Entire 33,000 acres left in untreated condition	Treated areas would not dominate landscape

Rationale of Proposed Decision:

Herbicide usage is necessary to achieve the proposed level of harvest with the measures indicated in A above, visual impacts will be minimized and criteria for the respective VRM classes met.

Table 1-11 (Continued)

ISSUE VII: SEEDING FOR WILDLIFE FORAGE: The effects of seeding and fertilizing roadsides and other disturbed areas to increase wildlife forage.

A wildlife recommendation is to increase wildlife forage by removing undesirable vegetation and establishing palatable grasses, forbs and legumes in existing meadows, other natural openings, roadsides, landings and skid roads.

	Alternatives Considered		
	Maximum Timber Production	Maximum Protection of other resources	Proposed Decision
A. Characteristics of the Alternative			
1. Application of seed and fertilizer to increase wildlife forage	Establish plant species which provide wildlife forage in existing meadows (except those occupying former forested areas). Seed palatable grasses on other disturbed sites and natural openings except on skid roads or cable yarding roads under 3,000 feet in elevation.	Rehabilitate all disturbed sites and natural openings (including areas formerly occupied by forest trees) by establishing palatable grasses, forbs and legumes.	Establish palatable grasses, forbs and legumes in those areas where moisture competition with tree seedlings is not a problem e.g. skid roads above 3,000 feet, and cut or fill slopes of roads and landings.
B. Effects			
1. Timber			
a. Reduction in land allocated timber management	None	Modest	None
b. Reduction in annual timber harvest	None	Minor	None
c. Reduction in annual local personal income	None	Modest	None
d. Loss of job opportunities	No loss	Minor	No loss
2. Wildlife	Minimum benefit to wildlife	Maximum benefit to wildlife	Significant benefit to wildlife

Rationale of Proposed Decision:

Meadows and other natural openings are important habitat components of many wildlife species. The proposed decision is to establish vegetation desirable for wildlife forage and cover in those areas where competition with tree seedlings is not a factor e.g. roadside cuts and fills, landings, and skid roads above 3,000 feet in elevation (moisture and temperature are critical elements below 3,000 feet, resulting in vegetative competition with trees).

Table 1-12

Resource Use Constraints Considered but Not Proposed for Lands Allocated to Timber Production

ISSUE I: DEER WINTER RANGE: The effect of timber harvest practices on the production of deer forage

The timber management recommendation is that 74 percent of the area proposed for timber harvest be cut with a shelterwood harvest system because it would take too long to reforest the lands if they were clearcut. The wildlife recommendation is that the amount of land proposed for clearcutting in deer winter range be increased because more deer forage is produced in clearcut areas than in areas where timber is harvested under a shelterwood or other partial cutting system.

	Alternatives Considered		
	Maximum Timber Production	Maximum Production of Deer Forage	Proposed Decision
A. Characteristics of the Alternative			
Areas of commercial forest land harvested by clearcutting and shelterwood cutting in first ten years following adoption of proposed timber management program			
a. Clearcut	5,000 acres	More than 5,000 acres	5,000 acres
b. Shelterwood cut	45,000 acres	Less than 45,000 acres	45,000 acres
B. Effects			
1. Timber			
a. Time required for forest regeneration	Less than 5 years	More than 5 years	Less than 5 years
b. Effect of regeneration lag on amount of land retained in timber production base.	Initial acreage retained	Initial acreage retained	Initial acreage retained
c. Effect on annual allowable harvest	Maintained	Reduced 422 bd.ft. for every acre clearcut over 5,000 acres	Maintained
2. Wildlife Habitat			
a. Deer forage produced	Less forage than with alternative involving increased clearcutting	More forage than with alternative involving best combination of harvest practices from silvicultural standpoint	Less forage than with alternative involving increased clearcutting
b. Effect on deer populations	Maintained at current level	Increased above current level	Maintained at current level

Rationale for Proposed Decision:

The proposed decision is to not harvest more timber by clearcutting than provided for in the timber management recommendation. The reasons are (1) the combination of harvest practices recommended for timber management would result in enough deer forage being produced to maintain current deer populations; and (2) clearcutting unsuitable areas would make reforestation within the required period of time unlikely.

Table 1-12 (Continued)

ISSUE II: ARTIFICIAL REFORESTATION: Its effects on upland game habitat

A wildlife recommendation is to provide additional upland game habitat by allowing 25 percent of each area in which timber is harvested to reforest naturally. On almost all lands in the unit, cutover areas cannot be reforested within a reasonable period of time if brush and grass are not controlled. Reduction of brush and grass reduces the quality of the areas as upland game habitat.

	Alternatives Considered		
	Maximum Timber Production	Maximum Provision of Upland Game Habitat	Proposed Decision
A. Characteristics of the Alternative			
Percent of cutover areas allowed to reforest naturally	Less than 25 percent	25 percent	Less than 25 percent
B. Effects			
1. Timber			
a. Timber production on lands allowed to reforest naturally	Full potential of site	Less than potential of site	Full potential of site
b. Effect on annual allowable harvest	Maintained	Could be reduced by as much as 25 percent or 4.56 MM cu. ft.	Maintained
2. Wildlife Habitat			
a. Area of quality upland game habitat in unit	Maintained at current levels with some increase possible	Increased above current levels	Maintained at current levels, with some increase possible
b. Upland game populations	Maintained at current levels with some increase possible	Increased above current levels	Maintained at current levels, with some increase possible

Rationale for Proposed Decision:

The proposed decision is to artificially reforest all high intensity management lands harvested in the future. Natural regeneration is the prescription for low intensity lands with approximately 5,000 acres to receive trial harvest. This, plus limited management lands where no harvest is planned, provide considerable upland game habitat.

Low Intensity Forest Management Lands

Trial harvest from low intensity lands is expected to provide empirical data on the actual length of the regeneration period and to determine what practices, if any, are effective to yield regeneration within 5 years. The proposal involves approximately 500 acres per year during the first decade. Selection of techniques would be made in consultation with appropriate experiment station personnel.

As a basis for design of the trial program, a two-stage shelterwood harvest system would be employed with reforestation by natural seeding. Herbicides may be used for site preparation during good seed years.

Resource conflicts for low intensity lands were essentially of the same types as those displayed in Tables 1-10 and 1-11 for high intensity lands. Inasmuch as harvest from low intensity lands is a trial program for one decade only, designed to generate specific information, none of the harvest will take place where resource conflict situations are identified. Adequate non-conflict areas are available to allow this program to proceed as planned during the decade.

Limited Management Lands

Lands in this category are excluded from high or low intensity management because of severe regeneration problems or fragile soils. The proposed decision is for no planned harvest from the 79,471 acres of limited management lands.

Research projects or experimental harvesting are being considered to determine the management practices that might be acceptable on these lands. Some harvesting may be possible, but research projects or less formal study projects will be required before this determination can be made.

Areas of conflict are similar to those of high and low intensity lands. Incidental harvest, should such be necessary, will be strictly governed by environmental assessments specific to the situation.

Minor Forest Products

Sales of minor forest products -- posts, poles, and particularly firewood -- have been an incidental aspect of the timber management program. The demand for firewood, especially by private parties for personal use, has been increasing annually. Some of the demand is met with slash or debris from timber sales.

Management of non-commercial forest land, primarily hardwoods, for firewood production was considered. Protection of oak species for use by cavity-nesting and other wildlife was also considered. Harvesting of firewood traditionally occurs above road cutbanks and within 200 feet of the road.

The proposed decision is to manage hardwood stands for firewood on non-commercial sites with existing road access, except that no cutting would be conducted in streamside buffers and oaks would be managed primarily for wildlife. Commercial firewood sales would be made as demand developed.

1.8.2 Federal, State and Local Government Interactions

The only BLM actions required to implement the proposal are a formal declaration of the allowable cut and an endorsement of the action by the Director of the Bureau. No other Federal, local or State agency must endorse the plan before implementation. However, in the process of plan development a number of governmental agencies were consulted to determine compatibility with their respective plans and interests, and to gain assistance in resolution of potential conflicts.

1.8.2.1 Planning Interactions

The Intergovernmental Cooperation Act of 1968 requires the fullest cooperation and coordination among all levels of government. The law directs all Federal agencies to notify State and local governments of significant project or development plans. This is accomplished through the Oregon State Clearinghouse which distributes project or plan documents to State agencies involved. The Medford District has furnished the clearinghouse with copies of land use planning documents (such as the narratives for the Unit Resource Analysis and Proposed Management Framework Plan) and regularly provides annual timber sales plans.

Under the Federal Land Policy and Management Act of 1976 (FLPMA), BLM is required to coordinate its planning and management with State and local governments and keep apprised of local planning efforts which may conflict with Federal plans. The act further requires BLM to develop land use plans consistent with State and local plans to the maximum extent accorded by Federal law and policy, and to assist in resolving conflicts.

During formulation of the proposal BLM personnel periodically informed local, county, State, and other Federal officials of actions underway and actively solicited their comments. In addition to personal contacts, newsletters describing the progress of JSYU land use planning effort were sent out periodically. When the proposal was developed, special briefings were conducted for officials of the indicated levels of government.

Oregon Senate Bill 100 requires that local governmental units establish a mechanism for cooperating with Federal agencies in the development of comprehensive land use plans. Cities and counties must contact all State and Federal agencies within their jurisdiction for this purpose. All counties and cities in Oregon are required further to develop and adopt comprehensive plans and land use controls consistent with statewide planning goals and guidelines. The regulating authority under SB 100 is the Oregon Land Conservation and Development Commission (LCDC). The relationship of the proposed action to LCDC goals is displayed in Table 1-13.

The LCDC has specified that a city or county may have only one comprehensive plan and that it must include the plans of all affected special districts, State, and Federal agencies. Although none of the

TABLE 1-13

Relationship of the Proposed Action to Statewide (LCDC) Goals

LCDC GOALS AND ALTERNATIVES		DISCUSSION
I.	To insure citizen involvement in all phases of the planning process.	Citizen involvement occurred throughout the planning process, including public meetings in Grants Pass, Glendale and Cave Junction. Public hearings on the Draft Environmental Statement were held in Grants Pass and Salem. For details see Chapter 9.
II.	To establish a land use planning process and policy framework as a basis for all decisions and actions.	The Federal Land Policy and Management Act and the Bureau's planning system provide such a process and framework. The proposed action has resulted from this process.
III.	To preserve and maintain agricultural lands.	The proposed action will not affect the use of agricultural lands in the area.
IV.	To conserve forest land for forest uses.	The proposed timber management plan is consistent with this goal. It stems from a proposed land use plan which provides for all of the forest uses defined in this goal statement.
V.	To conserve open space and protect natural and scenic resources.	The forest management practices proposed are inherently conservative of open space. The proposed underlying land use plan provides for preservation of natural and scenic resources considered significant. Some others considered of lesser significance would not be preserved.
VI.	To maintain and improve the quality of the air, water, and land resources.	The proposed action and underlying land use plan provided for maintenance of the quality of these resources, through use exclusion from sensitive areas and special management practices elsewhere.
VII.	To protect life and property from natural disasters and hazards.	Protection of hazard areas is provided for in the proposed action.
VIII.	To satisfy the recreational needs of the citizens of the State and visitors.	The proposed underlying land use plan provides for some recreational needs.
IX.	To diversify and improve the economy of the State.	Given the potential of the lands, the proposed land use plan seeks to achieve a balance in the production of economic resources from them. These resources mainly are timber, recreation and anadromous fishery. The proposed timber management plan will result in markedly reduced levels of timber harvest with consequent adverse short-term impact on the economy. Since the reduced harvest land will be sustainable, however, it will contribute to long term economic stability.
X.	To provide for the housing needs of the citizens of the State.	Although reducing the amount of wood harvested from the area, the proposed action does provide for a harvest sustainable over the long term.
XI.	To plan and develop a timely orderly, and efficient arrangement of public facilities and services.	The proposed action will not affect public facilities and service.
XII.	To provide and encourage a safe, convenient and economic transportation system.	The forest transportation system would be maintained and improved.
XIII.	To conserve energy.	Conservation and efficient use of energy sources are objectives in all BLM activities.
XIV.	To establish urban growth boundaries.	The establishment of urban growth boundaries will not be affected.

counties have completed revision of their comprehensive plans or gained LCDC approval, BLM routinely reviews and comments on draft plans as they are made available.

Although BLM has no authority to enter into binding commitments to be guided by comprehensive plans developed under State law, the mandate of the FLPMA practically assures BLM consistency with State and local comprehensive plans.

1.8.3 Interactions With Other Actions or Proposals

1.8.3.1 BLM Actions or Proposals

In addition to the proposed timber management plan, the Bureau has many ongoing subsidiary programs in the JSYU aimed at developing, enhancing or conserving resources other than timber. Major program areas include land exchanges, leasing for cattle grazing, watershed management, recreation management, and wildlife and fish habitat management.

1.8.3.2 Other Agency Actions or Proposals

In addition to BLM, other agencies have jurisdiction over lands within and adjacent to the JSYU. BLM cooperates with these agencies as far as possible to avoid conflicts and to insure wise use of natural resources. BLM interactions with these agencies and their current projects or proposals are described below.

Timber Management Plans

Most of southwestern Oregon is timber-producing land. In addition to the BLM, jurisdictions include the United States Forest Service, National Park Service, State of Oregon, the counties, and private individuals and companies. Each entity approaches management of timber lands differently although most periodically prepare internal or public plans for their management.

Summary data of timber harvest and management treatments has been gathered for the two river basins of which the JSYU is a part. BLM administers approximately 30 percent of the Rogue River Basin. Over 353,000 acres lie within the JSYU and the balance is within the Jackson and Klamath Sustained Yield Units. Portions of the Rogue River and Siskiyou National Forests are also within the basin. Table 1-14 shows the estimated acreage of annual timber management treatments within the basin based on recent years averages by jurisdiction. The State and private column of the table includes only major private landowners as no data are available for small timberland ownerships.

A similar situation exists within the South Umpqua River Basin. BLM administers approximately 25 percent of the basin. Of this, 72,500 acres are within the JSYU and the balance is in the Roseburg District. Estimated treatments in the South Umpqua drainage are as shown in Table 1-15.

Within the governmental sphere, coordination of planning is achieved through interagency involvement pursuant to authorities discussed in

Table 1-14

Annual Timber Harvest and Management Treatments
by Major Ownership

Rogue River Basin (Approximately 2,421,000 acres)

	BLM	USFS	State & Private	County	Total
Present Harvest (MM bd.ft.)	232	269	171	3	675
Shelterwood Harvest					
Acres	8,000	7,850	49,400	0	65,250
Volume	212	143	34	0	389
Clearcut Harvest					
Acres	500	4,700	12,350	0	17,550
Volume (MM bd.ft.)	15	118	137	0	270
Site Preparation (acres)					
Herbicide	450	400	1,200	0	2,050
Mechanical Scarification	50	550	1,000	0	1,600
Slash Disposal (acres)	800	-	2,000	35	2,835
Herbicide Release (acres)	450	2,600	2,000	-	5,050
Planting (acres)	2,800	7,550	3,000	540	13,890
Precommercial Thinning (acres)	400	1,300	2,500	2,700	6,900
Commercial Thinning (acres)	200	650	2,000	0	2,850
Fertilization (acres)	0	0	0	20	20
Road Construction (miles)	100	107	20	2	229

Source: Based on estimates provided by: BLM - Medford District; USFS - Rogue River National Forest and Siskiyou National Forest Supervisor's Office; Oregon State Forestry Department - Southwest Oregon Unit; and the Josephine County Forestry Department.

Table 1-15

Annual Timber Harvest and Management Treatments
by Major Ownership

South Umpqua River Basin (Approximately 1,069,000 acres)

	BLM	USFS	State & Private	Total
Present Harvest (MM bd.ft.)	106	120	9	235
Shelterwood Harvest				
Acres	700	1,700	100	2,500
Volume	10	50	2	62
Clearcut Harvest				
Acres	2,500	1,000	150	3,650
Volume (MM bd.ft.)	87	40	5	132
Site Preparation (acres)				
Herbicide	3,200	1,300	200	4,700
Mechanical Scarification	100	50	50	200
Slash Disposal (acres)	2,000	7,000	250	9,250
Herbicide Release (acres)	1,200	1,300	150	2,650
Planting (acres)	3,400	2,500	250	6,150
Precommercial Thinning (acres)	500	400	400	1,300
Commercial Thinning (acres)	0	200	0	200
Fertilization (acres)	150	900	0	1,050
Road Construction (miles)	36	60	4	100

Source: Based on estimates provided by: BLM - Medford and Roseburg Districts; USFS - Tiller Ranger District, (Umpqua National Forest); and the Oregon State Forestry Department - Southwest Oregon Unit.

Section 1.8.2.1. Private actions on private lands are regulated, as provided by applicable State law, by Oregon agencies responsible for implementation of each statute.

Other Agency Roles in BLM Actions

Authorities and responsibilities of other agencies are recognized in the preparation of specific management actions to be carried out under provisions of the proposal. While no other agency must endorse the overall management plan prior to its implementation (Section 1.8.2), the agencies discussed below have a role, or provide guidance, in planning and carrying out the treatments listed in Table 1-1.

Federal Agencies

The Josephine SYU shares in part a common boundary with the Siskiyou, Rogue River and Umpqua National Forests. Coordination between the BLM and Forest Service is continuous with regard to management of the Rogue National Wild and Scenic River. Periodic general coordination between the BLM District Manager and the Forest Supervisors is routine. Specific project and program coordination takes place as needed between all management levels of each agency and also between resource specialists. A cooperative agreement provides for interagency road use and another agreement relates to range resource matters.

The Army Corps of Engineers has the authority, under Section 404 of the Federal Water Pollution Control Act amendments of 1972, to regulate the discharge of dredged or fill materials into any wetlands or streams of the United States with flow in excess of 5 cubic feet per second. Normal silvicultural practices are exempt from regulation. Based on the adequacy of BLM environment protection practices the Corps has issued BLM a general permit for all such activities. Under the permit BLM provides the Corps, and certain environmental review agencies, with advance notice of specific projects.

The Bureau of Reclamation is active in investigation and development of water resources in the Medford District. The Merlin project is the only proposed Bureau of Reclamation project in the Josephine SYU which seems to have much potential for construction. Contact with Bureau of Reclamation has been infrequent, but should increase if the Merlin project progresses.

The principal role of the Fish and Wildlife Service in BLM management is an advisory one in the fields of wildlife management and endangered species protection. The BLM, in cooperation with the Oregon Department of Fish and Wildlife, solicits FWS advice for mammal population control work. Joint FWS-BLM projects are governed by a Memorandum of Understanding.

The Environmental Protection Agency (EPA) furnishes guidance to BLM in such matters as the abatement of water pollution resulting from timber harvesting and road construction. The EPA is the agency responsible for obtaining uniform compliance

with Section 208 of the Federal Water Pollution Control Act Amendments of 1972. In each State, the Governor is responsible for formulation of quality standards to the satisfaction of EPA.

The principal Small Business Administration (SBA) program interacting with BLM management in the JSYU is the timber sale set-aside program. The purpose of the program is to assure that small businesses (fewer than 500 employees) have the opportunity to purchase their historic share of timber sale offerings. The base period for analysis is the years 1968 to 1972.

On a semi-annual basis, small business timber purchases for the past year are reviewed. If small business has not purchased at least 90 percent of the base level timber volume, the set-aside program is activated. SBA, subject to BLM concurrence, determines which sales are set aside for small business, and larger firms may not purchase them unless small business fails to do so.

The JSYU is designated as a marketing area for analysis of small business success in purchasing timber. At present the set-aside program is activated in the JSYU since small business has not purchased its fair share in the preceding review period.

SBA also makes loans to small business enterprise. Involvement by BLM in SBA-Operator matters is limited to loan payment collections for SBA through BLM contracts involving only road construction. Incidence of SBA loans on BLM road construction contracts is infrequent to date.

The Federal Highway Administration (FHWA) is responsible for survey, design, and construction of major roads and bridge projects for BLM. These are paid for with appropriate monies collected from road users and supplemented with appropriated funds.

Coordination of BLM Access Road Projects is accomplished through the District Engineer and his staff in cooperation with the Oregon State Office of BLM and the FHWA.

State Government

The Oregon State Forester, by means of the Forest Protection Act of 1972, regulates timber harvest methods and supportive practices on all non-Federal lands within the SYU. Minimum standards are prescribed relating to the following forest practices:

- Reforestation of economically suitable lands
- Road construction and maintenance on forest land
- Harvesting of particular tree species
- Chemical applications
- Slash disposal

Although Federal agencies are not bound by State forest practice rules, Bureau minimum standards meet or exceed State rules. The BLM and USFS, acting jointly, have entered into a Memorandum of Understanding with the State Forester in this regard. Timber sale contracts provide for the purchasers, or their delegated representatives, to obtain permits for the operation of power-driven machinery from the Oregon State Department of Forestry (OSDF).

Purchasers must obtain burning permits from the OSDF in conjunction with required slash disposal operations unless burning is directly supervised by OSDF personnel. Slash burning is allowed to begin only when smoke dispersal conditions are favorable.

BLM is a cooperator in the statewide smoke management plan administered by the Oregon State Forester. The primary objective of the plan is to keep smoke out of population centers.

OSDF is the primary contractor for fire protection of public lands administered by BLM in the JSYU. That department undertakes presuppression and suppression actions for all lands in the area.

The recently published Forestry Program for Oregon (Oregon State Board of Forestry 1977) asks for certain levels of timber supply from Federally administered forests. The ability of the JSYU to meet the requested level of production is discussed in Chapter 8 as an alternative to the proposal.

Management of wildlife, including fish, within the JSYU is the responsibility of the Oregon Department of Fish and Wildlife. BLM, in management of lands under its jurisdiction, considers wildlife habitat as a resource category. Cooperative agreements describe the responsibilities of the two agencies.

The State Scenic Waterways unit of the Oregon Division of Highways, is responsible for administration of the State Scenic Waterways Act. The State Marine Board is responsible for enforcement of regulations regarding public use of surface waters in Oregon. Both BLM and the Forest Service are in continuous contact with these two State agencies concerning management of the Rogue Wild and Scenic River.

The Oregon Department of Environmental Quality (ODEQ) has been delegated the responsibility to develop air, water and noise quality standards based on broad EPA criteria. Standards relate to both Federal and non-Federal lands. BLM cooperates with ODEQ to insure that Bureau programs are considered in the formulation of standards and that BLM activities meet or exceed prescribed State standards for air, water and noise quality.

The Oregon Workmen's Compensation Board formulates and enforces safety codes for places of employment. Chapter 16 of the code specifically applies to logging. BLM timber sale contracts require all operations in connection with the contract to be conducted in compliance with applicable Federal, State and local safety codes.

County Government

BLM involvement with the five counties in the SYU is largely via the several boards of county commissioners. Through these bodies, county governments participate in planning for land use, road construction, and recreational developments on public lands administered by BLM. They also develop and operate recreation sites on public lands leased under the Recreation and Public Purposes Act.

County planning and zoning programs within the SYU are fully described in the Josephine Planning Area Analysis which is available for review in the BLM Medford District office. No county containing a portion of the JSYU has a revised county comprehensive plan which has been approved by the Land Conservation and Development Commission (LCDC). Each of the five counties which contain a portion of the JSYU uses slightly different names for the proposed zone designation encompassing public lands administered by BLM. No matter what the zones are titled, however, they all provide for timber production, grazing, and related uses, including recreation. Current county zoning in each case is compatible with existing and anticipated BLM land use programs. See also Section 1.8.2.1.

Regional Agencies

The Medford District works closely with the Rogue Valley Council of Governments (COG) on planning carried out under Section 208 of the Federal Water Pollution Control Act. Several agencies are involved in water quality monitoring, and the Rogue Valley COG coordinates their efforts. BLM supports the statewide 208 Water Quality Program and cooperates fully with Oregon DEQ to insure that the program reaches its objectives.

1.8.4 Requirements For Further Environmental Assessment

It is the policy of BLM to conduct an assessment of any action which could have an impact on components of the environment. Interdisciplinary assessment in accordance with BLM Manual 1791 is flexible, depending on the magnitude of the specific action.

The first of two major goals in an environmental assessment is to determine the significance of the action. When analysis discloses that significant impacts cannot be readily mitigated or that the proposed action involves a sensitive issue, a recommendation for preparation of a full environmental statement may be appropriate. Such recommendations are forwarded through channels to the Director of BLM. For instance, preparation of an environmental statement on BLM's western Oregon herbicide program has been approved and a draft has been issued.

In most cases, however, an environmental assessment will either identify modest impacts or lead to mitigation resulting in modest net impacts, thus precluding the need for a statement. With problems and conflicts identified through analysis, it is possible to design the proposed project in an environmentally sensible manner. Where the action is to be accomplished by a contractor, the environmental assessment is a primary means for determining appropriate contract stipulations, and this is the second major goal of the assessment.

Standard procedure requires preparation of an assessment of every proposed timber sale and forest development project. Similar actions may be grouped into one assessment. Examples of timber sale environmental assessments are available upon request from the Office of the State Director, Bureau of Land Management, P. O. Box 2965, Portland, Oregon 97208.

1.9 COMPARISON WITH PRESENT ALLOWABLE CUT

The present allowable cut plan for western Oregon was declared April 7, 1971, for application beginning July 1, 1971 (36 FR 6906). For all public lands administered by BLM in western Oregon the declared annual allowable cut is 1.172 billion board feet, Scribner equivalent. Based on forest resource conditions, other resource considerations, and environmental constraints specific to the Josephine Sustained Yield Unit, the allowable cut for the SYU is 146 million board feet per year (BLM 1970).

In comparing the 1971 declaration to the proposal, only the allowable cut on high intensity land may be considered. Volume from trial harvest on low intensity lands, while part of the proposal, was not arrived at through the allowable cut planning process.

In 1971 the timber production base (corresponds to high intensity lands of the proposal) was determined to be 334,500 acres following exclusions for other resource considerations. This figure compares to 222,058 acres in the proposed high intensity category, a difference of 33 percent. Figures 1-5 and 1-6 display land allocations to the timber production base in 1971 and in the proposal, respectively.

The present and proposed harvest levels were computed with field-generated data obtained through inventories. Average volume per acre and average site index are approximately the same. Empiric yield curves which show the average volume per acre by age class (Figure 1-7) display the similarity of results from the two inventories.

Age class distribution, figured on a percentage basis since acreage allocated to high intensity timber management changed, is practically the same. The distribution is as follows:

Percent of Commercial Forest Land

Age Class	1971 Inventory	1977 Inventory
0 - 90	32%	31%
100 - 190	22%	23%
200+	46%	46%

In addition to basic acreage differences, variation between the two allowable cuts is a factor of the assumptions built into the computations. Table 1-16 compares the assumptions. In 1971 it was assumed that genetically superior planting stock would be used for reforestation This has not proven to be the case, nor does it appear probable within the next 20 years. Therefore, wood production gains attributable to genetic stock were not included in the proposal.

No regeneration lag was assumed in computing the present allowable cut. It was thought that areas would be fully stocked with seedlings when final harvest cut of a three-stage shelterwood regime took place. Present evidence indicates that this will not occur as assumed. The proposal calls for underplanting

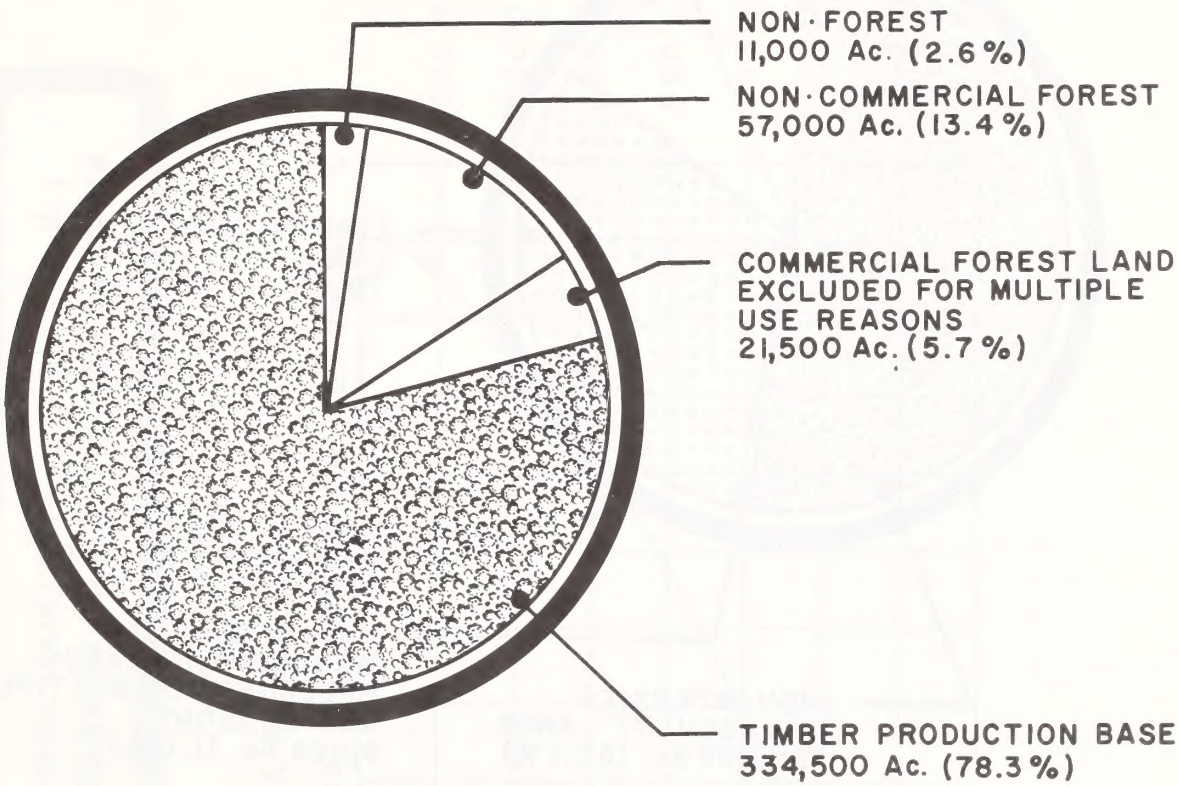


Figure 1-5 ACREAGE DISTRIBUTION IN THE 1971 ALLOWABLE CUT COMPUTATION

INVENTORY DATA:

- Total Inventory Volume——7,612,000 MBF Scribner Equivalent (23 MBF/Acre)
- Average Annual Yield Per Acre (base)——436 BF Scribner Equivalent
- Total Area of SYU——424,000 Acres
- Average Site Index——114
- Stand Density Index——68 Per cent

ASSUMPTIONS:

- Regeneration Lag——0 Years
- 1st Decade Intensive Management Practices——None
- Ultimate Per cent of Total Acreage to Undergo Pre-commercial and Commercial Thinning——49 Per cent
- Ultimate Per cent of Total Acreage to be Planted with Genetically Improved Stock——24 Per cent

SOURCE: BLM 1971

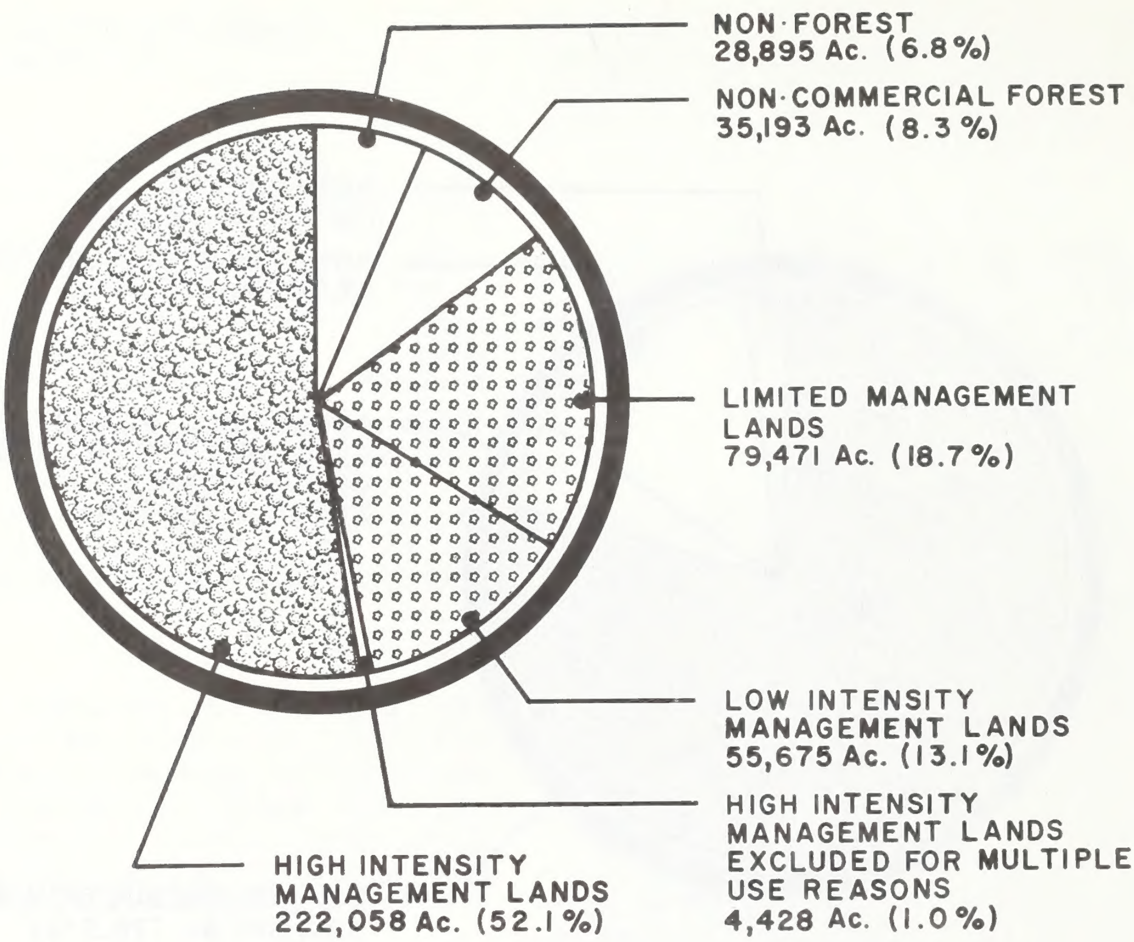


Figure 1-6 ACREAGE DISTRIBUTION IN THE 1977 PROPOSED ALLOWABLE HARVEST COMPUTATION

INVENTORY DATA:

- Total Inventory Volume—5,202,000 MBF Scribner Equivalent (23 MBF/Acre)
- Average Annual Yield Per Acre (high intensity)—417 BF Scribner Equivalent
- Total Area of SYU—425,720 Acres
- Average Site Index—115
- Stand Density Index—73 Per cent

ASSUMPTIONS:

- Regeneration Period—4 Years
- 1st Decade Intensive Management Practices:
  - Pre-commercial Thinning—14,200 Acres
  - Commercial Thinning—4,700 Acres
  - Fertilization—18,900 Acres
- Ultimate Per-cent of Total Acreage to Undergo Pre-commercial and Commercial Thinning—74 Per cent
- Ultimate Per cent of Total Acreage to Undergo Fertilization—74 Per cent

SOURCE: BLM 1977

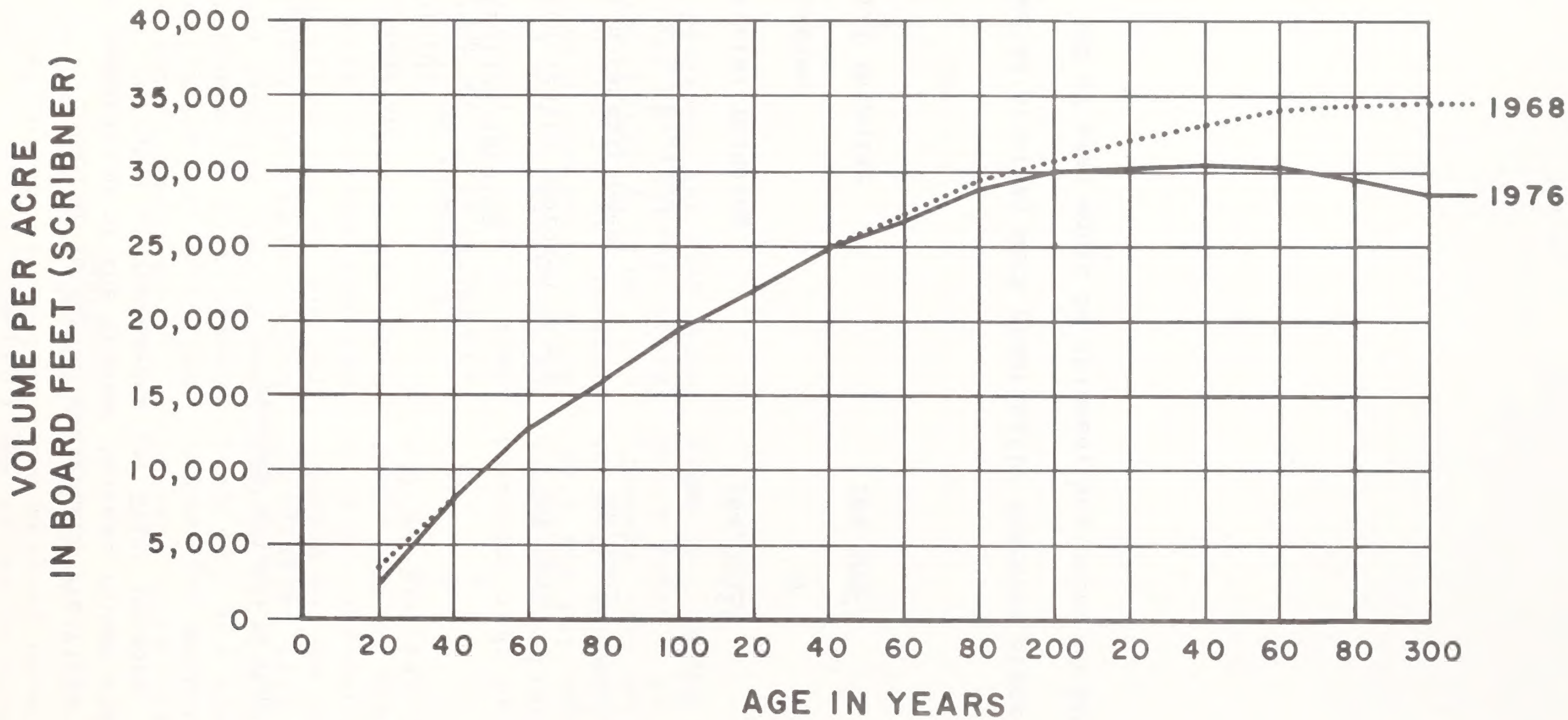


Figure 1-7 EMPIRIC YIELD CURVES • HIGH INTENSITY LANDS
SOURCE: BLM Forest Inventory • 1968 & 1976

Table 1-16

Total of Intensive Management Practices
Assumed in Computation of the Present Harvest Volume and the Proposal
Total of Treatments for Eight Decades

Treatment	Present Allowable Cut (Acres)	Proposal for High Intensity Mgmt. Lands (Acres)
1. Site Preparation		
a. Herbicide	0	147,300
b. Mechanical Scarification	0	12,500
c. Controlled Burning	0	39,000
2. Plant Genetically Improved Stock	80,300 1/	0
3. Plantation Establishment	80,300 1/	222,900
4. Release by Herbicides	0	187,000
5. Precommercial Thinning	164,000 2/	165,300
6. Fertilization	0	165,300
7. Commercial Thinning	164,000 2/	165,300

1/ All projected planting with genetically improved stock.

2/ Projects 49% of area would be thinned, beginning in 4th decade.

following the regeneration cut of the two-stage shelterwood program and recognizes a regeneration period of 4 years.

On the average, each year of increase in regeneration lag reduces computed allowable cut 1.5 to 2 percent. The difference in average annual yield per acre between the present declaration and the proposal is approximately 7 percent. This is directly attributable to the 4-year regeneration lag assumed in the proposal.

It would appear that increased application of intensive management practices (see Tables 1-1 and 1-16) should offset the downward effect of increased regeneration lag. However, an insufficiency of growing stock (see Table 1-7 and Figure 1-4) makes it impossible to capture the full allowable cut effect potentially available as a result of the indicated practices.

In summary, the present allowable cut is 146 million board feet compared to a proposal for 94 million board feet, Scribner equivalent, from high intensity land. The major factor in the difference is a 33 percent smaller area allocated to high intensity timber management.

It should be reiterated that an additional 1.76 million cubic feet (9 million board feet Scribner) is contained in the proposed 10-year timber management plan. This volume, however, is not part of the allowable cut, merely trial harvest in the first decade. It therefore cannot enter into the comparison.

2. DESCRIPTION OF THE ENVIRONMENT

In preparation of this chapter the primary data sources were documents of the Bureau planning system for the Josephine Planning Area. Unit Resource Analysis documents for Grants Pass, Galice, and Glendale Planning Units, and the Planning Area Analysis and the proposed Management Framework Plan for the Josephine Planning Area are available for review at Medford District Office, 310 West 6th Avenue, Medford, Oregon 97501.

Other references supplementary to or updating planning system data are cited within the body of the text by author and date of publication. A listing of these references appears in Appendix N, Literature Cited.

2.1 EXISTING ENVIRONMENT

The following sections address the environment as it exists today within the Josephine Sustained Yield Unit (JSYU, SYU). Since intensive timber management has been practiced within the SYU for several decades, the environment described is seldom natural or pristine but exhibits the actions of people.

As with any environmental statement, this section is critical as a basis on which impacts of the proposed action may be assessed. In preparation of Chapter 2, the team was cognizant of the proposed action and addressed those elements of the environment which might be affected. Peripheral environmental data are included only to the extent necessary to provide the basic picture.

2.1.1 Physical Environment

Physical environment refers to the non-living or inorganic elements of the environment. This section covers climate, air, soils, water, and fire.

2.1.1.1 Climate

Climate Classification

The climate of the Josephine unit is in a zone of transition between the Mediterranean climate to the south and the marine-mesothermal climate to the north. Differences in altitude within the SYU and proximity to the Pacific Ocean add to the complexity of the climate. Figure 2-1 illustrates a typical Mediterranean climate (Sacramento, California), the climate within the boundaries of the SYU (Grants Pass, Oregon), and a marine-mesothermal climate (Portland, Oregon) (Trewartha 1954).

Temperature and Precipitation

Altitude, aspect (the direction a slope faces), and wind patterns affect temperatures and precipitation in the SYU. Table 2-1 illustrates temperature and precipitation data for representative stations in the SYU. Freezing temperatures may be expected from mid-October through mid-May at Grants Pass (Ruttle 1973). Lowest temperatures rarely fall below 16 degrees in the SYU. Highest temperatures occur in July, often exceeding 90 degrees (sometimes reaching 100 degrees). Figure 2-2 shows the locations of weather stations in the SYU.

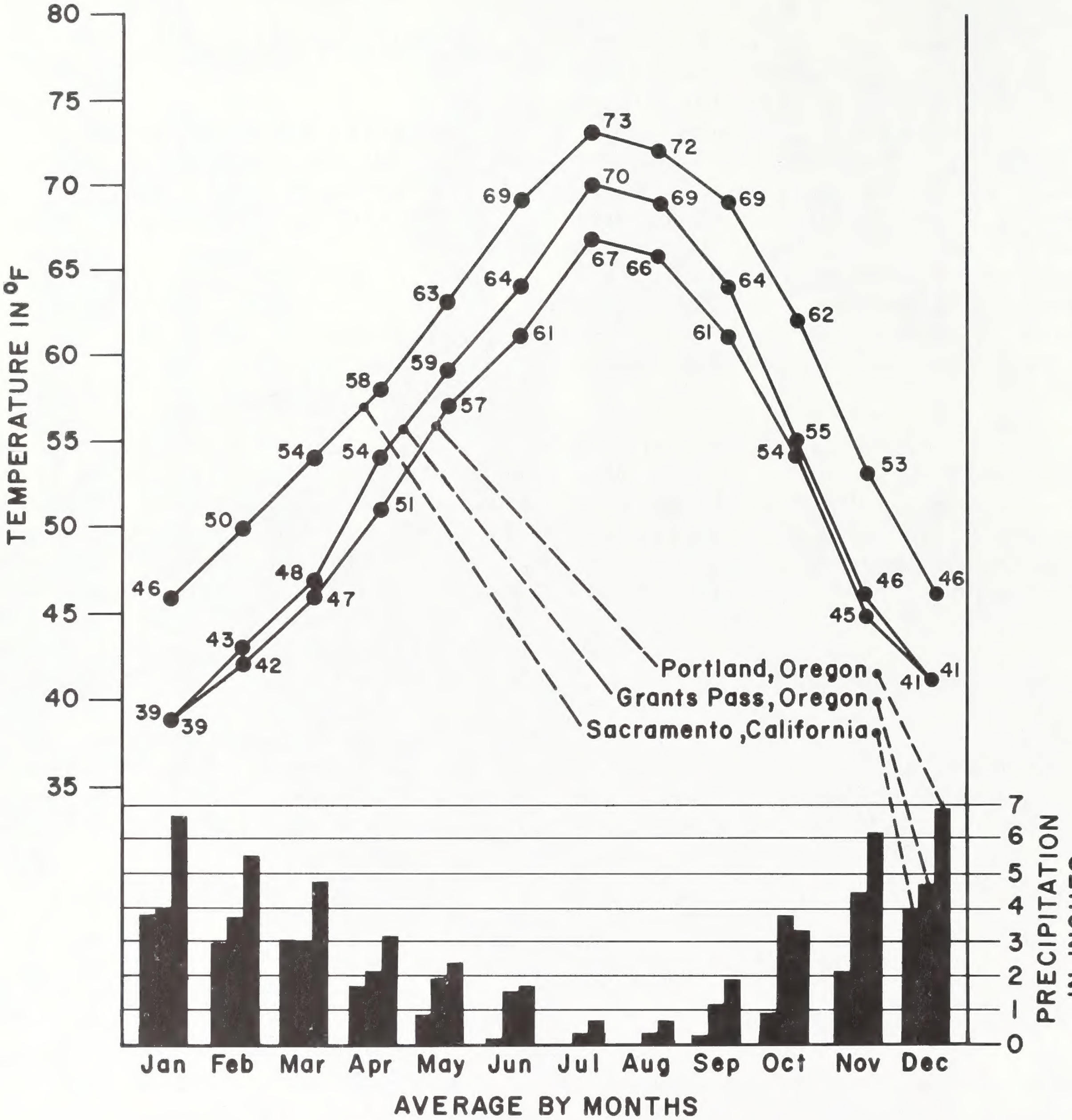


Figure 2-1 CLIMATE OF JSYU COMPARED
SOURCE: Trewartha 1954 & Johnsgard 1963

Table 2-1

Temperatures and Precipitation for Selected Stations in the Josephine SYU

		Temperatures (^{o}F)					Precipitation (in.)	
Station	Elevation	Average Annual	Average January	Average January Minimum	Average July	Average July Maximum	Average Annual	June thru August
Sexton Summit	3,836	48.0	34.1	30.0	63.6	76.4	33.1	2.1
Grants Pass	925	53.8	39.0	31.5	70.2	90.1	30.2	1.2
Williams	1.370	52.0	38.6	29.7	67.0	86.6	32.3	0.3
Cave Junction	1,280	53.3	38.9	--	69.6	--	79.4	0.3
Waldo Station	1,650	50.6	36.6	28.3	67.3	88.0	52.1	1.2
Wolf Creek	1,274	52.9	38.6	31.4	67.8	87.5	40.9	1.5
Glendale	1,390	52.7	39.5	31.8	68.1	88.1	37.7	1.5

Source: Galice, Glendale and Grants Pass URAs
File data from US Weather Service, Medford

Figure 2-2 LOCATIONS OF WEATHER STATIONS

SOURCE: Galice & Grants Pass URA

Precipitation is winter-concentrated, occurring mainly in frequent, long-duration, low-intensity storms. Table 2-1 illustrates the total annual precipitation for recording stations in the SYU. The June through August amounts are a small fraction of the total annual precipitation. Grants Pass receives 5.8 inches of precipitation in January while receiving only 0.25 inches in July (Ruttle 1973). Snowfall generally occurs above 2,500 feet. Snowpack builds above 3,000 feet from December to May. The lower elevations and valleys receive only minor amounts of snow (less than 1 foot total per winter), all of which melts quickly. Figure 2-3 illustrates mean annual precipitation over the SYU and vicinity.

Storm Events

Storm events in the JSYU are concentrated during the period from October to April. Storms are classified on the basis of how often a storm of that intensity and duration is expected to occur. An intense storm (such as the severe event of December 1964) would have an expected return frequency of 50 to 100 years. Average storms would have an expected frequency of 2 years (Rothacher et al. 1968).

Winds

During the winter, westerly winds of 10 to 30 mph are commonly initiated by frontal systems. Preceding severe winter storms, high winds in excess of 40 mph blow constantly for 12 or more hours. Higher gusts sometimes occur during passage of the front. Winds of very light intensity (0-5 mph) dominate the SYU in July and August. Moist unstable air may cause brief thundershowers and winds variable in direction and intensity.

Periodic winter storms, accompanied by high winds, regularly break or uproot trees throughout the SYU. Normally, volume of timber loss can be held to a minimum by including isolated trees or small groups of trees with the planned harvest of timber in the area.

Occasionally, extremely high winds, such as those created in the Columbus Day storm of 1962, can cause an abnormal blowdown situation which could completely disrupt the timber management program for a period of several years. Prompt salvage is necessary to avoid buildup of destructive insect populations in damaged timber (see Section 2.1.2.2, Forest Insects of Economic Significance).

2.1.1.2 Air Quality

Authority

Under the Clean Air Act Amendments of 1970, Oregon has been divided into five Federal Air Quality Control Regions (AQCRs) on the basis of pollution concentrations, geography, and economics. The Josephine SYU lies in the Southwest Oregon AQCR (Figure 2-4). In 1969, the Regional Air Authorities and the predecessor of the Oregon Department of Environmental Quality (ODEQ) established an Emmissions Inventory (EI) for the entire State. It contains information on the types and quantities of air contaminants emitted into the airshed.

Present Air Quality

All of the Southwest Oregon AQCR is in compliance with Federal and

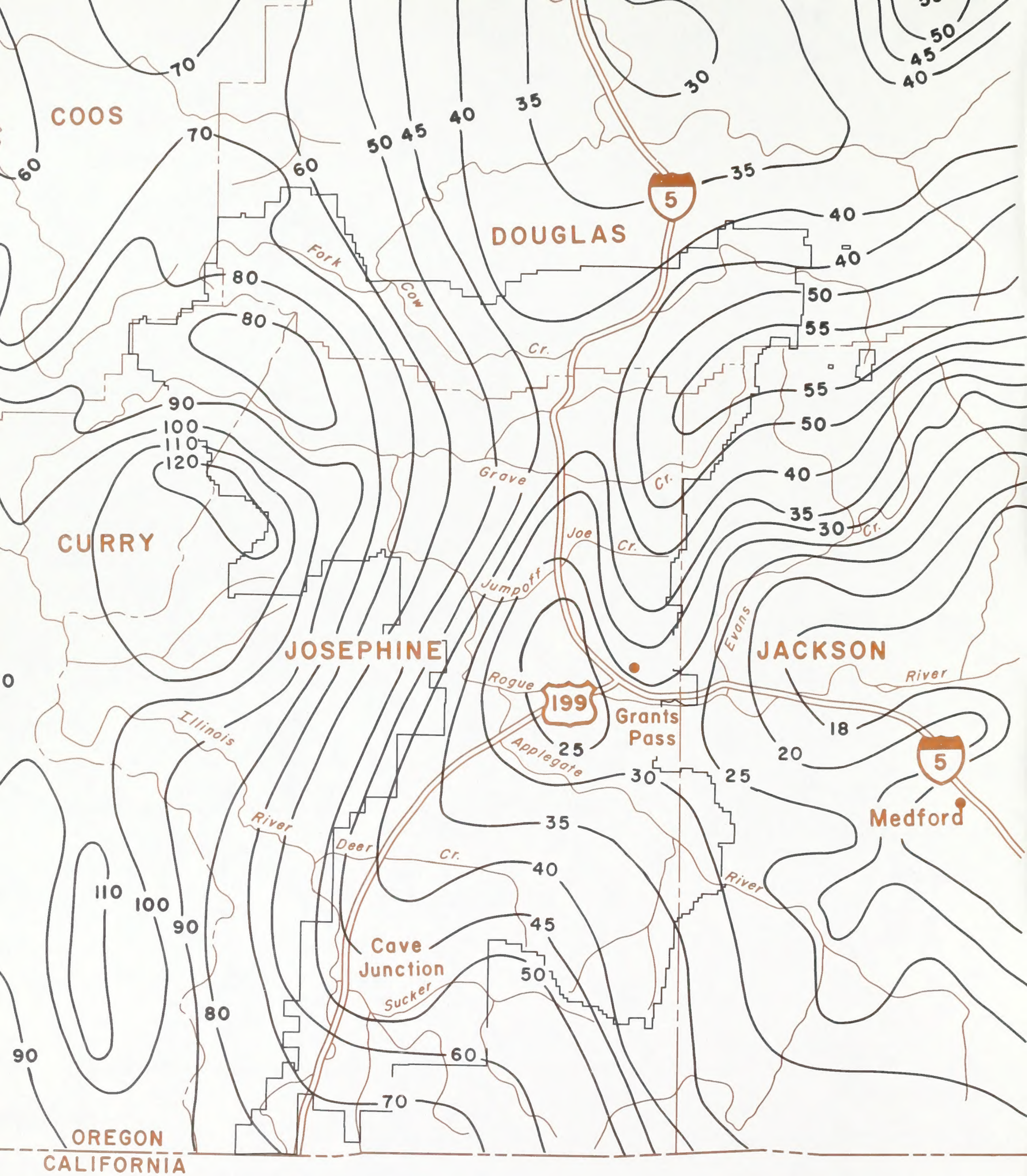


Figure 2-3 MEAN ANNUAL PRECIPITATION • WESTERN OREGON IN INCHES

SOURCE: Pacific Northwest River Basins Commission, 1970

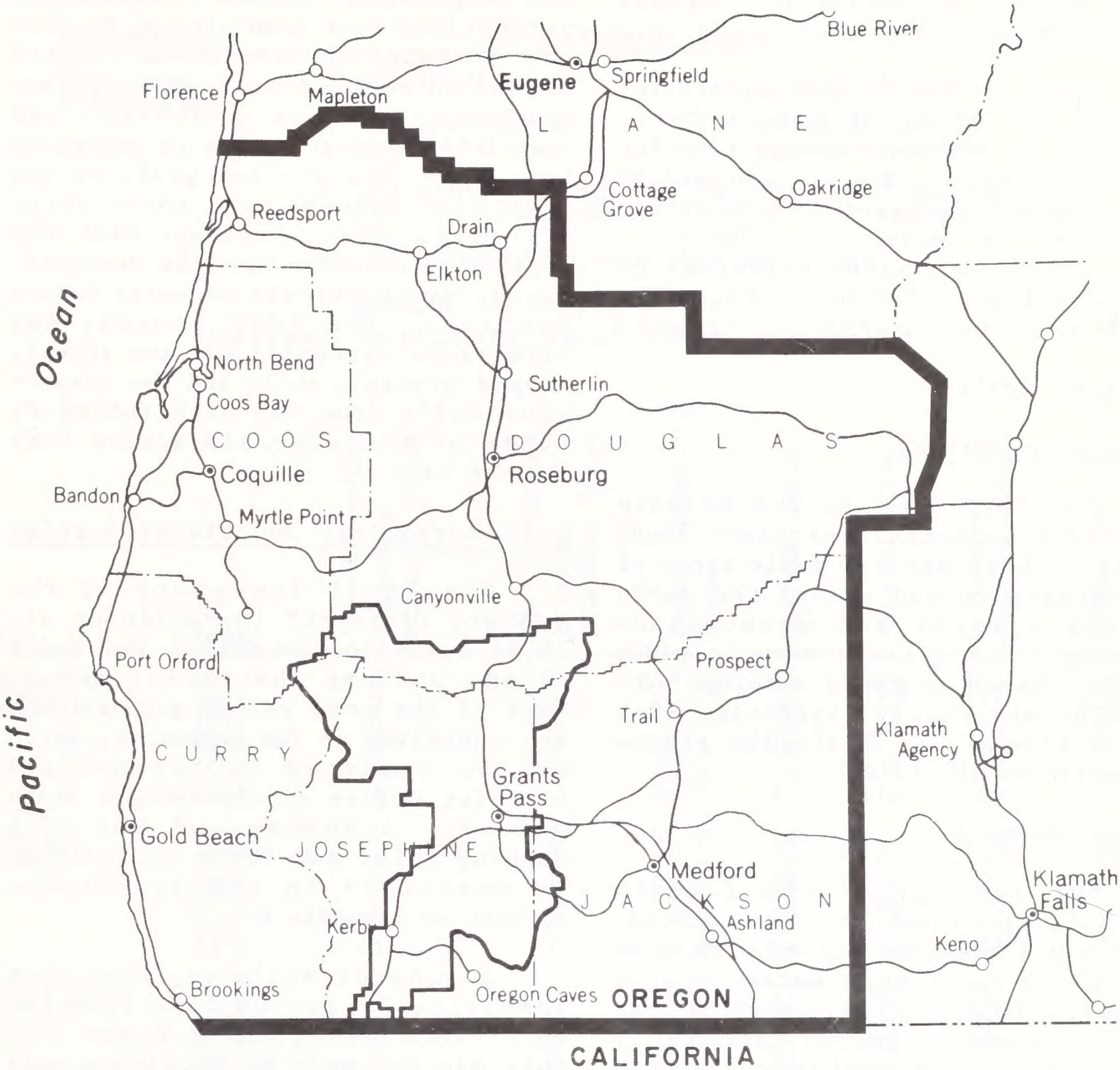


Figure 2-4 **SOUTHWEST OREGON INTRASTATE AIR QUALITY CONTROL REGION**

SOURCE: ODEQ 1976

State Ambient Air Quality Standards (with the exception of Medford which lies outside of the SYU). Air quality is closely monitored in the area because potential for serious air pollution is high.

There is one monitoring station within the JYSU, at Grants Pass, Oregon. It has been in operation for 7 years. Table 2-2 gives a breakdown of suspended particulate concentrations for the entire AQCR. Table 2-3 summarizes estimated emissions by source category for both the entire AQCR and for Josephine County.

2.1.1.3. Soils

Topographic Setting

The JSYU lies in the Klamath Mountains geographic province (Hunt 1974). There are two basic types of topography in and around the JSYU: inland valleys and mountainous uplands. The valleys vary in width and are level to gently sloping. The uplands are deeply dissected, with steep slopes and knifelike ridges (Franklin et al. 1973b).

Parent Material

The geology of the Klamath Mountains province is very complex. Very old (Paleozoic and early Mesozoic) rocks have been metamorphosed (altered in mineral structure by heat and/or pressure) and/or intruded by granitic and ultrabasic igneous rocks. Folding and faulting have increased the complexity of the area even further (McKee 1973).

Two types of rock present, granitic and ultrabasic, have weathered to soils which have caused problems in the timber management program. The granitic rocks weather to soils with a sandy subsoil (called grus) which is very unstable on steep slopes. When wet, it is very prone to slump failures and landslides. The ultrabasic rocks (dunite and peridotite) have been altered by heat and pressure to serpentine. Soils formed on serpentine have high clay content, shallow profiles, and restricted vegetation due to magnesium toxicity. The shallow profiles and high clay content make these soils droughty. This, together with the magnesium toxicity (and the droughtiness), makes serpentine soils unproductive. The TPCC process has eliminated virtually all the steeply sloped granitic soils and the serpentine soils from the high intensity lands of the proposed action (see Chapter 1).

Soil Morphology and Classification

The "Soil Inventory of the Medford District" (DeMoulin et al. 1975) describes in detail the soils of the JSYU at the series level. Maps of the soil series associations are contained in the inventory, which may be examined at the Medford District Office or the Oregon State Office. A summary of the soil mapping units and their properties, as described in the inventory, appears as Appendix H.

A general soils map developed specifically for the URA from the soil inventory appears in Figure 2-5. This map was made by combining soil associations of the Medford district inventory that have similar properties.

Erosion

The rate of erosion on the lands subject to the proposed action in the JSYU can be inferred from rates

Table 2-2

Ambient Air Sampling Data, Suspended Particulate

Note: Available data was evaluated with respect to the National Ambient Air Quality Standards listed below:

Contaminant	Federal Standards	
	Primary (Health)	Secondary (Welfare)
Suspended Particulate	(1) 75 ug/m^3 annual geometric mean	(1) 60 ug/m^3 annual geometric mean
	(2) 260 ug/m^3 maximum 24 hr. concentration*	(2) 150 ug/m^3 maximum 24 hr. concentration*

*Not to be exceeded more than once/year

Ambient Air Sampling Data
Suspended Particulate, ug/m^3 (24 hr. sample)

Site	Year	Days Exceeding Secondary Standard Value	Days Exceeding Primary Standard Value	Annual Geometric Value	Minimum Value	Maximum Value	Secondary Highest Value	Number of Samples
Ashland 1502105	1970	0	0	47.2	13	118	104	107
	1971	3	0	37.0	20	237	215	110
	1972	0	0	53.7	16	125	114	87
	1973	0	0	48.3	18	127	117	51
	1974	0	0	49.5	8	105	86	44
	1975	1	0	50.7	17	170	123	58
Coos Bay 0607101	1970	1	0	51.7	16	152	129	89
	1971	1	0	53.6	14	185	137	49
	1972	0	0	44.9	16	108	101	81
	1973	1	0	50.1	21	164	123	56
	1974	0	0	47.9	15	127	111	52
	1975	0	0	37.1	13	95	93	59
Grants Pass 1707105	1970	4	0	58.0	13	249	247	103
	1971	3	0	59.1	19	246	204	87
	1972	1	0	61.3	24	197	141	75
	1973	0	0	53.8	22	140	139	41
	1974	0	0	48.4	15	145	123	46
	1975	2	0	56.8	22	179	173	47
Medford 1520117	1969	11	1	--	32	301	235	75
	1970	13	1	76.6	16	298	208	170
	1971	5	0	78.9	21	226	222	84
	1972	7	0	83.4	23	207	192	91
	1973	3	0	69.9	33	183	162	56
	1974	5	1	75.9	23	301	223	58
	1975	7	0	71.7	22	228	214	66
Roseburg 1027017	1970	3	0	50.6	15	231	223	106
	1971	2	0	51.2	17	185	180	98
	1972	2	0	59.3	21	222	162	88
	1973	4	0	52.9	16	233	181	58
	1974	4	1	64.7	16	263	258	57
	1975	0	0	43.9	21	93	89	52

(Source: ODEQ 1976a)

Table 2-3

Summary of Estimated Annual Emmissions (Tons/Year) by Source Category
Southwest Oregon Intrastate Air Quality Control Region

TOTAL PARTICULATES

SOURCE CATEGORY	ENTIRE AQCR (TONS/YEAR)	JOSEPHINE CTY (TONS/YEAR)
A. FUEL COMBUSTION SOURCES:		
1. RESIDENTIAL FUEL COMBUSTION	116	13
2. COMMERCIAL FUEL COMBUSTION	164	19
3. INDUSTRIAL FUEL COMBUSTION	8,507	226
TOTAL FUEL COMBUSTION	8,789	258
B. PROCESS LOSS SOURCES:		
1. CHEMICAL INDUSTRIES	8	0
2. FOOD/AGRICULTURE INDUSTRIES	84	1
3. METALLURGICAL INDUSTRIES	927	0
4. MINERAL PRODUCTS INDUSTRIES	168	30
5. PETROCHEMICAL INDUSTRIES	0	0
6. WOOD PROCESSING INDUSTRIES	5,562	376
7. OTHER INDUSTRIES	0	0
TOTAL PROCESS LOSS	6,752	407
C. TRANSPORTATION SOURCES:		
1. MOTOR VEHICLES	1,877	279
2. OFF-HIGHWAY FUEL USE	121	8
TOTAL TRANSPORTATION	1,998	287
D. SOLID WASTE SOURCES:		
1. INCINERATION	11	0
2. OPEN BURNING	120	0
3. WIGWAM WASTE BURNERS	900	179
TOTAL SOLID WASTE	1,033	179
E. MISCELLANEOUS AREA SOURCES:		
1. FIELD BURNING	4	0
2. FOREST FIRES	2,375	109
3. SLASH BURNING	6,585	469
4. OTHER	305	21
TOTAL MISCELLANEOUS	9,269	599
SUMMARY BY SOURCE CLASS:		
1. AREA SOURCES	11,556	924
2. POINT SOURCES	16,286	813
TOTAL OF ALL SOURCES	27,842	1,737

(Source: ODEQ 1976a)

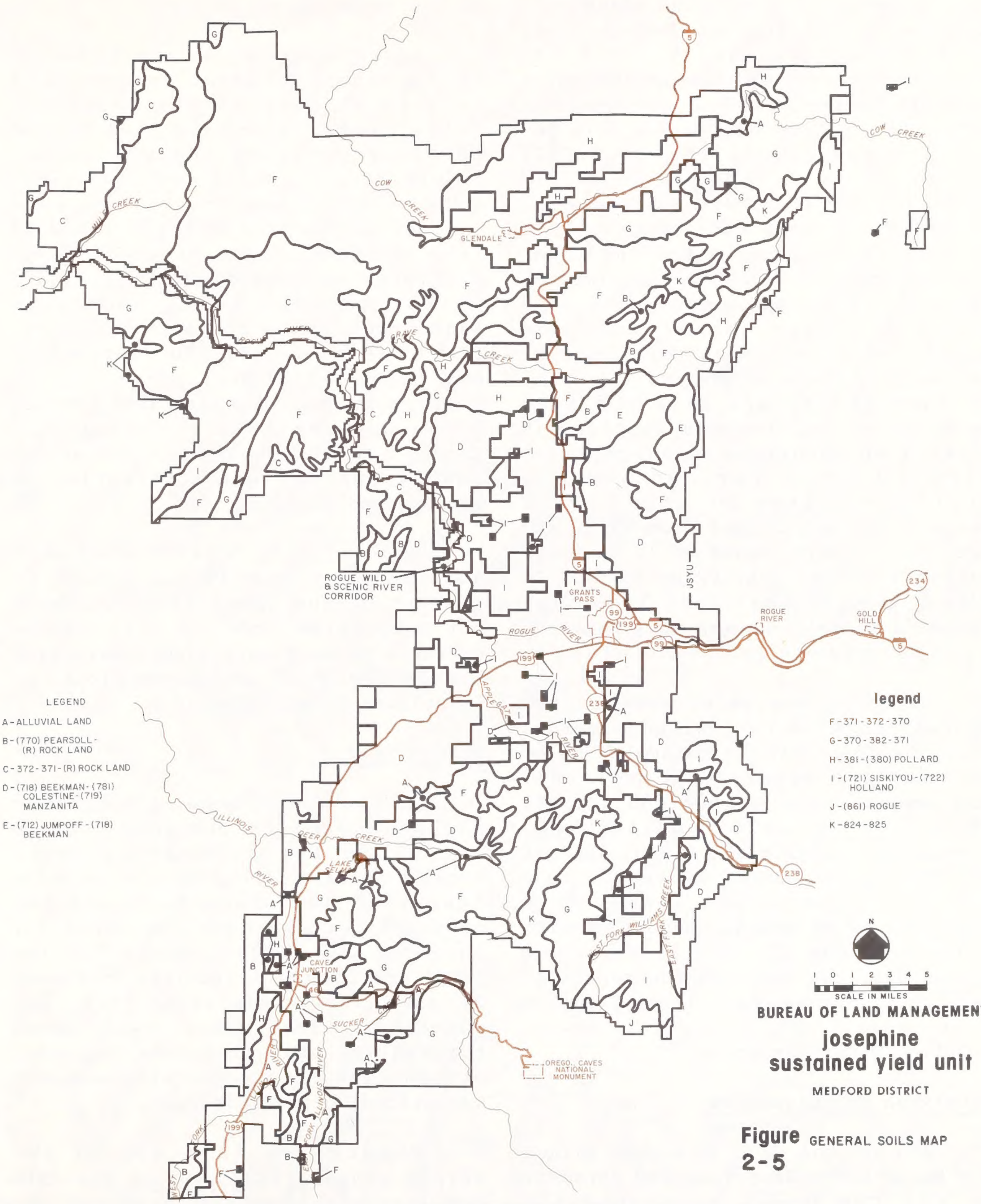


Figure 2-5 GENERAL SOILS MAP

of erosion measured on other timberland in western Oregon and elsewhere. Erosion on undisturbed forest lands on three watersheds in the H. J. Andrews Experimental Forest (50 miles east of Eugene, Oregon) was measured as 73 to 93 tons per square mile per year, or an annual loss of 0.0012 inches of soil (Fredriksen 1970). Soils on basalt parent material with 70 percent slopes had losses of 2 to 19 tons of soil per square mile per year in the H. J. Andrews Experimental Forest, and 4 to 9 tons on 2 to 8 percent slopes in the Bull Run Watershed (Fredriksen per. comm.). In another study in Oregon, losses of 24 tons per square mile per year occurred in undisturbed Douglas-fir forests on sandstone parent material with 20 to 50 percent slopes. Similar studies of soils on 55 percent slopes, formed from tuffs and breccias, found losses of 14 tons per square mile per year (Rice 1977). In Idaho, granitic soils on 30 percent slopes had soil losses of 9 tons per square mile per year (Ibid).

Based on the above studies, the overall erosion rate of undisturbed lands in the JSYU is estimated to be 45 tons per square mile per year. The present rate of erosion for all lands in the JSYU (undisturbed, disturbed, industrial, urban, and all others) is estimated to be 200 tons per square mile per year. This compares to an average annual erosion rate of from 77 to 232 tons per square mile per year for the continental United States (Hunt 1974, p. 145).

2.1.1.4 Water Resources

Watershed Relationships

All of the JSYU is within either the Rogue River Watershed (80 percent) or the Cow Creek Watershed (20 percent). The latter is a tributary of the South Umpqua River.

Water movement in the forest is an important element in watershed relationships. As precipitation falls, some is intercepted by the forest vegetation and evaporates before reaching the ground. Precipitation that does reach the soil surface penetrates through the duff (the surface layer of needles and partially decayed organic material) to the mineral soil. The rate that water enters the soil (infiltration) often exceeds 150 centimeters per hour (59 inches per hour) in western Oregon (Dyrness 1969; Ranken 1974; and Yee 1975 In Harr 1976). Lack of surface runoff is one of the most important characteristics of undisturbed forests.

Subsurface water movement accounts for nearly all runoff in western Oregon (Harr 1976b). Water not evaporated from the soil surface or taken up by plants either maintains streamflow as it moves downslope, or percolates to groundwater.

Water Yield

In the forest water cycle, water may be stored in the soil profile and/or in the underlying rock. Because soils in the JSYU are normally less than 40 inches deep and the underlying rocks have low porosity, they can store only a fraction of the total precipitation (Pacific Northwest River Basins Commission 1970, pp. 856-858). Since excess water moves through the soil to stream channels, stream flow fluctuates with seasonal variations in precipitation.

Figure 2-6 is a map of the stream gauging stations in the JSYU and Appendix I contains graphs of the

Figure 2-6 LOCATIONS OF STREAM GAUGING STATIONS

SOURCE: USGS, 1976

mean monthly and annual discharges of the major streams. The close relationship between monthly precipitation and monthly runoff, and the extremely variable annual stream discharge due to fluctuations in snow pack, precipitation, and temperature can be seen.

Water Quality

Water quality refers to the combined physical, chemical, and biological characteristics of streams. Water quality descriptions contain analyses of water samples for the individual chemical and biological substances present (constituents), and the effects that these constituents have upon the water (properties). Table 2-4 contains water quality descriptions of the Rogue River at Agness, just outside the SYU boundary (USGS 1976), and Table 2-5 contains similar data for the South Umpqua River near Roseburg.

Present water quality in the Josephine SYU generally meets with water quality standards established by Oregon DEQ to fulfill their "nondegradation" policy (ODEQ 1976c). Table 2-6 contains a summary of water quality of major perennial streams in the JSYU monitored by various agencies. Water quality criteria for the State of Oregon appears in Appendix J.

2.1.1.5 Fire

Wildfire Occurrences

While there is extreme variation from year to year, the main cause of wildfire is lightning. Man-caused fires, however, burn considerably more acres and cause more resource damage. Table 2-7 shows fire occurrence in the JSYU since 1966.

The fire season in the SYU generally begins in May and often lasts until the middle of October. Weather during this time of year is conducive to forest fires with high temperatures, low humidity, and numerous isolated thunderstorms. It is also the major recreation season.

Fire Protection

In western Oregon, BLM contracts all fire presuppression and fire fighting operations to the Oregon State Board of Forestry.

Where special or extra protection is desired, the fire plan and contracts provide for this. Within the SYU 125,000 acres adjacent to the Rogue Wild and Scenic River have been covered by special protection provisions since 1970.

2.1.2 Biological Environment

Common names are used, where possible, for all plants and animals discussed in this section. A complete list of common and scientific names for all organisms discussed will be made available on request. In some cases, such as several of the endangered plants, no common names exist and, therefore, scientific names must be used in the text.

2.1.2.1 Vegetation

Terrestrial Vegetation

Terrestrial vegetation is described in terms of "zones" adapted from those identified by Franklin & Dyrness (1973) in their Natural Vegetation of Oregon and Washington. Unless otherwise noted, all terrestrial vegetation data are drawn from that source.

Table 2-4

Water Quality of Rogue River near Agness, Oregon for Water Year October, 1974 to September 1975

Date	Instantaneous Discharge ft^3/sec (flow rate)	Ca^{++} (mg/1) (calcium)	Mg^{++} (mg/1) (magnesium)	Nitrate & Nitrite (mg/1)	Total N (mg/1)	Total P (mg/1)	pH	Turbidity (JTU)	Suspended Sediment (mg/1)	Suspended Sediment Tons/Day	Temperature °C	Temperature °F	Total Organic Carbon (mg/1)
10/22	1400	11	3.1	—	—	0.08	7.5	—	4	15	11.5	52.7	—
11/18	2090	11	4.3	0.06	0.65	0.09	7.2	1	38	214	9.0	48.2	—
12/19	4400	9.7	3.8	0.12	0.27	0.13	7.1	7	9	107	7.0	44.6	—
1/28	7400	9.7	3.7	0.13	0.31	0.07	6.6	10	22	440	4.5	40.1	2.8
2/19	15900	8.6	4.0	0.15	4.2	0.16	7.2	60	31	1330	5.5	41.9	—
3/19	90900	8.8	3.3	0.02	1.4	1.1	7.1	400	2600	638000	6.0	42.8	—
4/23	7680	12	3.7	0.08	0.14	0.06	7.3	5	22	456	10.5	50.9	5.7
5/22	7850	7.4	2.9	0.04	0.06	0.05	7.3	7	67	1420	12.5	54.5	—
6/18	5380	8.1	2.3	0.01	0.68	0.05	7.3	3	30	436	16.0	60.8	—
7/23	1910	9.5	3.4	0.01	0.17	0.08	7.5	2	8	41	22.0	71.6	3.2
8/20	2020	9.6	3.3	0.10	0.26	0.13	7.4	3	12	65	18.0	64.4	—
9/24	1550	11	0.8	0.03	0.54	0.10	7.7	1	6	25	17.5	63.5	—

N = nitrogen
P = phosphorous

(Source: USGS 1976)

Table 2-5

Water Quality of Umpqua River near Roseburg, Oregon for Water Year October, 1974 to September 1975

Date	Instantaneous Discharge ft^3/sec (flow rate)	Ca^{++} (mg/1) (calcium)	Mg^{++} (mg/1) (magnesium)	Nitrate & Nitrite (mg/1)	Total N (mg/1)	Total P (mg/1)	pH	Turbidity (JTU)	Temperature ^oC	Temperature ^oF	Dissolved Oxygen (mg/1)
10/23	80	21	11	1.3	1.8	0.52	7.3	7	13.0	55.4	6.9
11/19	2400	17	3.9	0.22	1.0	0.21	7.1	10	10.0	50.0	11.3
12/20	7000	11	3.0	0.12	0.26	0.08	7.0	30	8.5	47.3	10.9
1/29	4300	10	3.1	0.23	0.34	0.04	6.7	15	4.5	40.1	13.2
2/20	28000	6.1	2.8	0.06	0.53	0.22	7.2	20	7.0	44.6	12.0
3/18	12200	7.8	3.7	0.05	0.31	0.12	7.2	85	8.5	47.3	11.2
4/22	3270	9.0	3.6	2.3	2.3	0.05	7.2	6	11.0	51.8	11.3
5/21	2320	40	2.8	0.02	0.12	0.03	7.3	3	13.5	56.3	9.7
6/17	820	8.8	2.9	0.00	1.1	0.06	7.3	2	19.0	66.2	9.4
7/22	570	15	5.2	0.07	0.50	0.17	7.8	1	25.5	77.9	8.4
8/19	383	15	6.7	0.19	0.84	0.30	7.6	2	21.0	69.8	7.8
9/23	244	15	6.7	0.20	0.90	0.38	7.7	2	20.0	68.0	-

N = nitrogen
P = phosphorus

(Source: USGS 1976)

Table 2-6

Summary of Water Quality of Major Perennial Streams in Josephine SYU by Source

State of Oregon, Department of Environmental Quality, February 1976

Name of Stream Location of Station	Temperature °C-°F Jun - Oct Nov - May	Temperature °C-°F Jun - Oct Nov - May	Dissolved Oxygen mg/l Jun - Oct Nov - May	Dissolved Oxygen % Saturation Jun - Oct Nov - May	Turbidity JTU Jun - Oct Nov - May	Total Dissolved Solids Jun - Oct Nov - May	Chloride Jan - Dec	MPN Tc/100ml Jun - Oct Nov - May	Flow Ft^3/sec Jun - Oct Nov - May
Rogue River	10-50	25-77	8.1 - 12.0	87 - 135	1 - 15	46 - 90	0.5 - 4.3	45 - 24,000	750 - 4750
at Grants Pass	2-36	12-54	10.7 - 13.5	93 - 111	- 1	65		230 - 24,000	1417 - 8290
Rogue River 2.5 mi.	10-50	25-77	7.8 - 11.5	83 - 124	2 - 17	64 - 106	0.8 - 4.3	230 - 7,000	-- --
west of Grants Pass	3-37	13-55	11.0 - 13.1	97 - 112	1	64		600 - 7,000	-- --
Rogue River at	11-52	26-79	7.9 - 12.0	87 - 135	0 - 25	36 - 136	0.5 - 9.8	45 - 7,000	-- --
Robertson Bridge	4-39	14-57	10.8 - 13.0	97 - 114	0 - 33	53 - 174		230 - 7,000	-- --
Rogue River below	14-57	22-72	8.0 - 10.3	89 - 108	1 - 15	39 - 98	0.5 - 4.9	45 - 700	-- --
Grave Creek	--	11-52	11.6	107	4	25		7,000	-- --
Applegate River	10-50	26-79	8.1 - 12.4	84 - 147	0 - 48	30 - 159	0.5 - 46.2	45 - 2,400	11 - 716
at Applegate	4-39	13-55	9.8 - 12.8	98 - 107	1 - 16	69 - 179		45 - 7,000	77 - 1150
Applegate River	12	28	7.5 - 12.3	78 - 138	0 - 20	43 - 140	0.2 - 9.7	45 - 2,400	-- --
at Wilderville	5	14	10.4 - 12.4	92 - 108	1 - 42	45 - 99		60 - 7,000	-- --
Cow Creek	14	26	7.5 - 10.3	89 - 115	1 - 15	84 - 129	0.2 - 18	60 - 7,000	-- --
at Glendale	5	16	9.6 - 12.0	91 - 100	2 - 65	64 - 109		0 - 2,400	-- --

U.S. Environmental Protection Agency, Storet Data (Computer Retrieval Service for Water Quality), Data for Josephine SYU as of 5-2-77 (All numbers given are mean values for all samples taken over a three year period from January 1973 to August 1976)

Name of Stream Location of Station	Temperature °C	Temperature °F	Turbidity JTU	Conductivity Micromhos @ 25°C	Dissolved mg/l	Dissolved % Sat	Bod mg/l	pH	Total N mg/l	Total P mg/l	Total Org. C mg/l	Chloride mg/l	Sulfate mg/l	Total Coliform MPN Conf/ 100ml
W. Fork Illinois River at Hwy 199 Bridge	-	-	-	-	-	-	-	-	-	-	4.7	-	-	-
Sucker Creek at Takilma Rd. Bridge	13	55	2.8	95	9.7	94.8	0.35	7.2	0.5	0.2	3.5	1.7	1.9	489.2
Louse Creek at Pleasant Valley Rd. Br.	18.6	65.5	4.0	110	7.9	98.0	0.7	7.5	-	-	-	-	-	450
Quartz Creek at Mouth	13.3	55.9	3.0	95	9.4	98.0	0.5	7.2	-	-	-	-	-	450
Jumpoff Joe Creek at Russel Rd. Br.	17.3	63.1	-	120	9.2	100	0.5	7.6	-	-	-	-	-	450

See Figure 2-6 for locations of stream gauging stations

Table 2-7

Fire Occurrence on Public Lands in the Josephine Sustained Yield Unit

	Lightning-Caused		Man-Caused	
Year	Number	Acres[1/]	Number	Acres[1/]
1966	25	25	5	197
1967	--	--	2	68
1968	4	2	6	71
1969	15	35	7	21
1970	6	4	7	2481[2/]
1971	2	1	2	4
1972	15	6	3	2
1973	27	21	11	346
1974	29	20	13	10
1975	43	25	7	64
1976	7	2	2	4
	173	141	65	3268

1/ Estimates rounded; class A fires figured at 0.25 acres each.
2/ Includes 2,269 acres in Quail Creek fire.

Source: BLM Fire Reports on file Oregon State Office.

Zones within the JSYU are as follows:

1) Interior Valleys Zone (pines, oaks and Douglas-fir).

2) Douglas-fir/Hardwoods Zone (Douglas-fir, evergreen hardwood).

3) Mixed Conifers Zone (Douglas-fir, pines, incense-cedar and true firs).

4) White Fir Zone (white fir).

The arrangement of these zones in the eastern and western Siskiyou Mountains of the JSYU is shown in Figure 2-7. The acreage distribution of these zones by land jurisdiction is given in Table 2-8. Waring (1969) has identified the floristic boundary between the eastern and western Siskiyous as far north as the Rogue River. Lacking botanical studies to fix the boundary north from the Rogue River, a probable boundary has been projected based on climate, geology, and observed vegetation patterns.

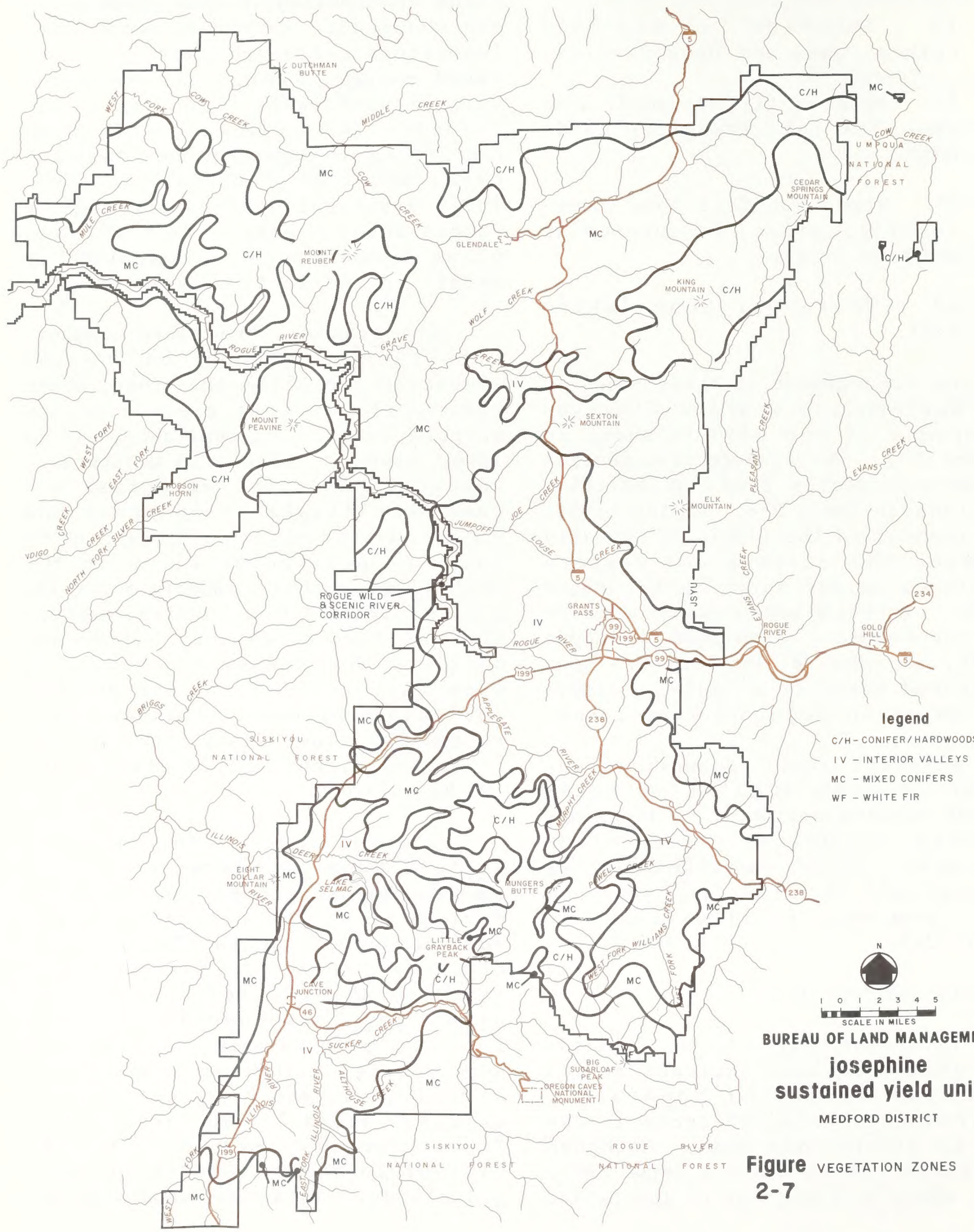
Numerous plant communities may occur in each vegetation zone. Forest stratification, i.e. layering, differs considerably with plant community. Forest stratification for a "typical" Douglas-fir hardwoods zone community is illustrated in Figure 2-8.

Interior Valleys Zone

This zone refers to the lowlands and valley bottoms enclosed by the Siskiyou (Klamath) Mountains. Approximately 245,000 acres in the SYU is within this zone. Although scattered conifer forests occur here, only about 6.8 percent of the public lands within the zone is considered commercial forest land (Table 2-8). Plant communities include grasslands, oak woodlands, evergreen shrub lands (sometimes called chaparral), scattered conifer forests, and streamside (riparian) forests (Franklin et al. 1973b). The occurrence of these communities is dependent upon temperature, moisture, and soil factors. Their distribution does not reflect successional trends. Each of these plant communities is described in detail in the sections which follow.

Grasslands. Grassland communities generally occur on the low elevation foothills and steep, south facing slopes that are too dry to support trees. The dominant grass is Idaho fescue. Bluebunch wheatgrass, Junegrass and pine bluegrass are common. Alaska onion-grass and mountain brome are frequently found on more moist sites in the foothills. Other commonly occurring grasses include blue wildrye, western and California fescues, California oatgrass and Canada bluegrass. A wide variety of forbs are present including collomia, brodiaea, bedstraw, lomatium, dusty pink, yarrow, coyote mint, and woolly eriophyllum (Hickman 1976).

Oak Woodlands. The Interior Valleys Zone is characterized by forest stands, groves, and savannas dominated by the deciduous Oregon white oak, California black oak and the evergreen Pacific madrone. Typical shrubby species, though occurring infrequently, include Pacific poison oak, California honeysuckle, white-leaved manzanita, Klamath plum, and birchleaf mountain mahogany (Ibid.). The grasses and forbs growing beneath the oaks are similar to those found in the open grasslands. These oak woodlands are



BUREAU OF LAND MANAGEMENT

josephine sustained yield unit

MEDFORD DISTRICT

Figure 2-7 VEGETATION ZONES

Table 2-8

Vegetation Zone Tabulations by Land Jurisdiction

Public Lands

	Acres	% Public 1/	% Total 2/ SYU	% Zone 3/ Total	Acres Comm'l Forest	% of Public in SYU	% of Comm'l 4/ Forest on Public
Interior Valleys	39814	9.4	4.7	16.3	15595	3.7	6.8
Douglas-fir /hardwoods	154493	36.3	18	81.1	87109	20.5	38.0
Mixed Conifer	230489	54.1	26.9	54.8	125905	29.6	54.9
White Fir	924	.2	.1	96.2	701	.2	.3
Totals	425720	100	49.7		229310	54	100

Other Jurisdictions

	Acres	% of Other	% Total SYU	% Zone Total
Interior Valleys	204655	47.5	23.9	83.7
Douglas-fir /hardwoods	35969	8.3	4.2	18.9
Mixed Conifer	190464	44.2	22.2	45.2
White Fir	36	N	N	3.8
Total	431124	100	50.3	

1/ % Public = The percentage of public lands within the SYU occupied by each specified vegetational zone.

2/ % Total SYU = The percentage of all lands in the SYU regardless of of jurisdiction, occupied by each specified vegetation zone.

3/ % Zone Total = The percentage of the vegetation zone occurring within each land jurisdiction.

4/ % of Commercial Forest on Public Land = The percentage of public land in each zone identified in the TPCC as Commercial Forest Lands (not all of which are included in the high intensity category).

N = Negligible

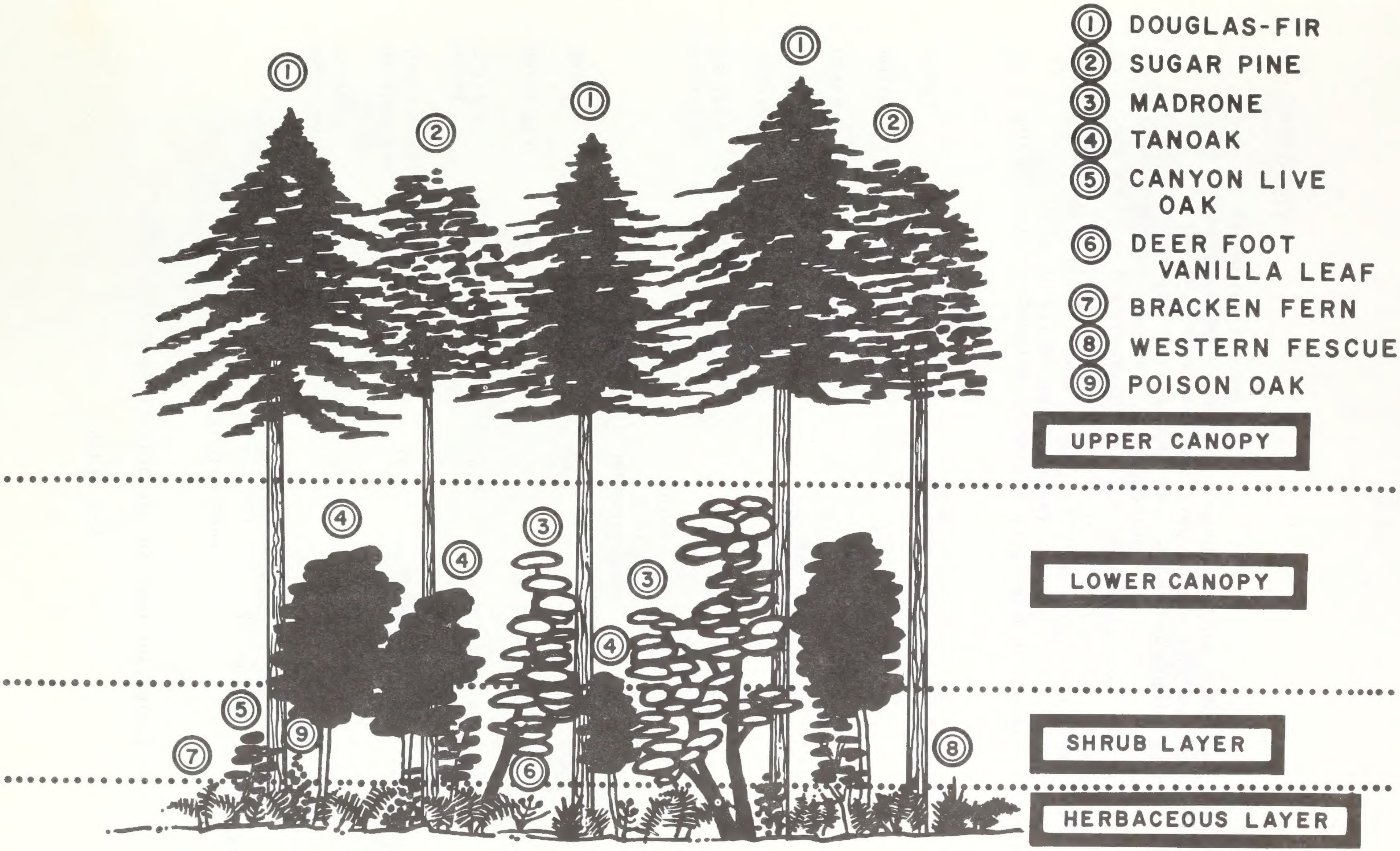


Figure 2-8 TYPICAL FOREST STRATIFICATION • MIXED EVERGREEN ZONE
SOURCE: After Franklin and Dyrness 1973

the driest forest formations in the JSYU. On more moist sites and northeast slopes, Douglas-firs, ponderosa pines, and incense-cedars penetrate the oak canopy. On drier sites, the oak canopy decreases and annual grasses and forbs increase. South and southwest slopes are commonly grasslands with only a few scattered oaks or none at all.

Evergreen Shrublands (Chaparral). Numerous evergreen shrub communities occur within the Interior Valleys Zone. Some of these chaparral communities are climax, whereas others are maintained by recurring fires. Predominant species include deerbrush, wedgeleaf ceanothus, Pacific poison oak, skunkbrush sumac, white-leaved manzanita, hoary manzanita, curlleaf mountain mahogany, pale serviceberry, and white stem rabbitbrush. The understory is dominated by Idaho fescue. A variety of forbs such as brodiaea, bedstraw, and collomia are also present (Ibid.).

Conifer Forests. Hillcrests and more moist slopes within the Interior Valleys Zone support a ponderosa pine-hardwood community. Douglas-fir, incense-cedar, and sometimes white fir are associated with the ponderosa pine. Typical hardwoods found with the conifers include bigleaf maple, Oregon white oak, California black oak and Pacific madrone.

Douglas-fir/Hardwoods Zone

Approximately 38 percent of the commercial forest land on public lands within the SYU is located in the Douglas-fir/hardwoods zone. Most sites within the zone are generally occupied by a mixed forest of evergreen needle-leaved trees (upper strata) and evergreen broadleaved trees (lower strata). This zone grades into the Interior Valleys Zone at its lower elevational limit and into the White Fir Zone at its higher elevational limit. In the eastern Siskiyous, this zone is replaced by the Mixed Conifers Zone.

Forest Composition. The upper canopy is dominated by Douglas-fir, with sugar pine frequently present on ridge tops and south- and west-facing slopes. The lower, evergreen broadleaved (sclerophyll) tree canopy is dominated by tanoak associated with canyon live oak, Pacific madrone, and golden chinkapin. Douglas-fir and tanoak are considered to be the major climax species in this vegetative zone. The shrub layer averages about 30 percent coverage and is typically composed of canyon live oak, Oregon grape, trailing blackberry, baldhip rose, and Pacific poison oak.

On more moist sites, Port-Orford-cedar and Douglas-fir or western redcedar and western hemlock dominate the overstory. Small broadleaved evergreen trees are present but not dominant. Western yew, vine maple, California hazel, white alder, and Pacific dogwood are typical understory species along with rhododendron, salal, Oregon grape, trailing blackberry, twinflower, sword fern, and deerfoot vanilla leaf.

On drier sites, a sclerophyll/Douglas-fir community is dominant. It is characterized by an overstory (with less than 50 percent crown coverage) of Douglas-fir and a closed canopy of sclerophylls. Tanoak is characteristically the dominant sclerophyll, but Pacific madrone and canyon live oak are also abundant. Typical shrubs are baldhip rose, Pacific poison oak, and trailing blackberry. Similar stands, but

lacking Douglas-fir, occur frequently on south slopes.

Knobcone pine often regenerates after wildfires within this zone. It forms extensive, pure stands, particularly on the drier sites.

Special Communities. Except for the unique vegetation found on serpentine sites (described in "Vegetation of Unique Habitats"), dense evergreen chaparral brushfields are the most conspicuous "special community" found within the Douglas-fir/Hardwoods Zone. Typical species are hoary and green manzanitas, tanoak, canyon live oak, huckleberry oak, Sadler oak, small golden chinkapin, bear bush, boxleaved garrya (silktassel), California coffee berry, gooseberry, currant, mountain whitethorn ceanothus, and pygmy Oregon grape.

Mixed Conifers Zone

The Mixed Conifers Zone occupies elevations from about 2,500 to 4,500 feet in the eastern Siskiyou Mountains. This zone accounts for approximately 55 percent of the commercial forest on public lands within the SYU (Table 2-8). It is bounded by the Interior Valleys Zone at its lower limit and by the White Fir Zone at its upper limit.

Forest Composition. Major tree species in this zone are Douglas-fir, sugar pine, ponderosa pine, incense-cedar, and white fir, with Douglas-fir the most abundant. The white fir, as discussed here, is part of the grand fir-white fir species complex common in southwestern Oregon. Some population of trees resemble grand fir while others resemble white fir. In this ES, all true fir populations are referred to as white fir.

Incense-cedar appears to be less common in the eastern Siskiyous. Sugar pine and ponderosa pine usually occur as scattered individuals but give the forests much of their character. The proportion of incense-cedar is greatest on the drier sites. White fir is often present mainly as seedlings and saplings in existing mixed-conifer stands. Other typical tree species include bigleaf maple and Pacific madrone. Characteristic understory species include California hazel, creambush oceanspray, golden chinkapin, creeping snowberry, trailing blackberry, and baldhip rose.

Special Communities. No forested "special types" have been described for the Mixed Conifers Zone.

White Fir Zone

This zone occupies a relatively narrow elevational belt above 5,400 feet in the eastern Siskiyous. It provides about .3 percent of the commercial forest land in the SYU. The zone grades into the Mixed Conifers Zone at its lower limit.

Forest Composition. White fir is the major tree species within this zone, often forming pure or nearly pure stands. The most common associate is Douglas-fir. Sugar pine, ponderosa pine and western white pine may also be present in small numbers. Incense-cedar is often found on moderately moist sites. Shasta red fir is increasingly common toward the upper limit of the zone.

Characteristic understory species include creambush oceanspray, baldhip rose, Oregon grape, California

hazel, Rocky Mountain maple, trailing blackberry, snow dewberry, Saskatoon serviceberry, and golden chinkapin.

Successional Patterns

Although plant community succession is virtually unknown in the JSYU, several identifiable seral habitat types generally result following a canopy-removing disturbance in coniferous forest communities. A brief grass and herb stage is followed by a slightly longer stage dominated by shrubs and coniferous seedlings, with some grass and herbaceous ground cover still remaining. The shrub/seedling stage is then gradually replaced by the pole/sapling stage in which conifer growth is fairly rapid, eventually causing crown closure and the diminishing of understory vegetation. The young second growth seral stage follows the pole/sapling stage. During the young second growth stage, the conifers undergo rapid height and diameter growth. Only shade tolerant plants remain in the understory. The mature and old growth successional stages, respectively, follow the young second growth stage. Conifer growth rate slows and the incidence of tree disease and mortality increases.

Climax vegetation types are not definitely known in the JSYU. It appears that Douglas-fir, ponderosa pine-oaks and chaparral may be the potential climatic climax communities in the Interior Valleys Zone.

On dry slopes and sites with south exposures and/or shallow soils in the Conifer/Hardwoods Zone, chapparal communities are climax. These communities are dominated by hard-leaved shrubs such as hoary and green manzanitas. Brushfields dominated by softer-leaved shrubs or tanoak, chinkapin and Pacific madrone will probably be replaced by conifers, conifer-tanoak or conifer-chinkapin mixtures.

White fir is the major climax species over the entire mixed conifers zone. Fires and logging keep white fir from dominating the overstory, but its potential as climax species is indicated by its dominance in reproductive size classes. On warm, dry sites, Douglas-fir and/or incense-cedar appear to be climax. On more moist habitats, white fir is climax.

White fir appears to be the sole climax species in the White Fir Zone, although incense-cedar and/or Douglas-fir may be climax associates.

Although the plant species composition, relative abundance and duration of these seral stages is unknown in the JSYU, a rough estimate of their natural durations, in sequence, following initial disturbance is:

Grass/forb:	0	years
Shrub/seedling:	0-15	years
Pole/sapling:	16-40	years
Young second growth:	41-119	years
Mature:	120-200	years
Old growth:	201+	years
Climax:	?	

Acres in each seral stage, within each vegetation zone, were computed for commercial forest lands in the JSYU base for allowable cut determination. Data for the computations were obtained from five point inventory age class determinations (Section 1.4.1.1, 1976 reinventory discussion). Such data, however, are not directly applicable for seral stage tabulations because age classes

are assigned on the basis of the determinations (Section 1.4.1.1, 1976 reinventory discussion). Such data, however, are not directly applicable for seral stage tabulations because age classes are assigned on the basis of the approximate ages of commercial timber species and do not consider the presence of non-commercial plants. Regeneration difficulties on a particular plot may have precluded the establishment of commercial species for many years after initial forest disturbances; nonetheless that plot is assigned an age class equal to that of newly established commercial species. All plots which, for one reason or another, do not contain commercial species are classified as "non-stocked" regardless of the age of existing vegetation. Also, age classes are given in 10-year increments, which makes it impossible to objectively tabulate the grass/forb successional stage (which generally persists for less than 10-years) from age class data.

Therefore it is necessary to assume that, on good sites, the first two seral stages (grass/forb and shrub/seedling) will have been succeeded by the pole/sapling stage by age class 20 and that later seral stages can be more accurately tabulated from age class data. The acreages so computed for these seral stages, by vegetation zone are shown in Table 2-9.

Table 2-9

Computed Acreages of Seral Stages of Vegetation Zones

	Interior valleys Zone	Douglas fir/ hardwoods Zone	Mixed Conifer Zone	White fir Zone	Totals
Grass/forb and Shrub/seedling	704	8,920	14,839		24,463
Pole/sapling	624	6,244	4,946		11,814
Young second growth	4,055	16,947	19,785		40,787
Mature	1,560	19,623	18,548		39,731
Old growth	8,733	37,463	65,618	701	112,515
	15,676	89,197	123,736	701	229,310

Vegetation of Unique Habitats

Serpentine Soils. Serpentine areas are characterized by unusual plant communities and vegetation. Plants are stunted on serpentine soils in comparison with those on adjacent nonserpentine soils.

Serpentine areas in this discussion are habitats with soils low in calcium and high in magnesium, chromium, and nickel. (A full description of serpentine soils is given in the Soil Inventory of the Medford District, pages 14, 97 and 98.) Areas of serpentine soils are shown in Figure 2-5.

Forest Composition. The outstanding feature of serpentine sites is the Jeffrey pine/grass woodland

which occupies the driest serpentine sites between 1,000 and 6,500 feet in elevation. Jeffrey pine is typically the only tree species present, along with a sparse growth of grasses (e.g. lemon needlegrass, big squirreltail, Geyer oniongrass, blue wildrye, and sheep fescue) and an occasional white-leaved manzanita.

Forests intermediate in elevation and moisture are typified by a sparse, dry appearance and are dominated by a mixture of Douglas-fir, incense-cedar, Jeffrey pine, sugar pine, and knobcone pine. Associated with these trees is evergreen brush including huckleberry oak, tanoak, red huckleberry, box-leaved garrya (silktassel) and Oregon myrtle.

Other community types on serpentines include: (1) Port-Orford-cedar/ Douglas-fir stands in ravines and draws, with a dense, shrubby understory and (2) higher elevation forests dominated by white fir, Douglas-fir, and western white pine, singly or collectively, over an understory of common beargrass and pine-mat manzanita.

Serpentine Indicator Plants. Common serpentine indicator plants include Jeffrey pine, podfern, dwarf ceanothus, common woolly sun-flower and small-flowered willowweed.

Streamside (Riparian) Vegetation. Oregon ash and Port-Orford-cedar are very characteristic species of streamside habitats in the interior valleys within Josephine SYU as well as in the adjacent, higher elevation forest zones. Bigleaf maple also occurs commonly. Understories vary widely from nearly nothing under dense stands to herbaceous (with sedges being characteristic) or densely shrubby types.

Aquatic Vegetation

The majority of aquatic plant communities within the JSYU are lotic (running water) communities. Although some lake or pond (lentic) habitat occurs on private lands, it is limited to a few, mostly ephemeral, ponds on BLM lands. The predominant aquatic plant habitats on BLM lands within the JSYU include streams, rivers, seeps and springs.

Stream and River Communities

In streams and other moving waters two major habitat zones are generally evident: the rapids zone and the pool zone. The rapids zone is usually shallow water where the speed of the current is great enough to keep the bottom clear of silt and other loose materials, thus providing a firm bottom. This zone is occupied largely by specialized rooted or clinging plants.

The pool zone is generally deeper water with a reduced current; silt and other loose materials tend to settle here, providing a soft bottom. The soft bottom is more favorable for some kinds of plankton and less favorable for rooted plants.

Phytoplankton is the most prevalent aquatic vegetation found in running water. In small streams, plankton originates in ponds or backwaters connected with streams and is carried downstream, often being destroyed as it passes through rapids. Only in slow-moving portions of streams and in the larger Illinois and Rogue Rivers is plankton able to grow and multiply.

Permanently attached plants often found in streams and rivers include certain green algae (such as

cladophores), encrusting diatoms and certain mosses (such as Fontinales spp.).

Seeps and Springs

Seeps and springs are numerous and widespread in the JSYU. The plant communities associated with seeps and springs seem to be in a steady state with little change occurring over time. Spring and seep communities are also characterized by relatively small numbers of species. Plankton is absent.

Threatened and Endangered Plants

As provided by the Endangered Species Act of 1973, the U.S. Fish and Wildlife Service published in the Federal Register (40 FR 127:27828-27924, 1975; 41 FR 117:24524-24572, 1976) lists of more than 1,700 species of vascular plants proposed for endangered or threatened status. The Smithsonian Institution, which compiled the list, defined endangered plants as "those species in danger of extinction throughout all or a significant portion of their range." Threatened species were defined as those "likely to become endangered in the future."

A species is considered either threatened or endangered because of any one of the following five factors: "(1) the present or threatened destruction, modification, or curtailment of its habitat or range; (2) over utilization for commercial, sporting, scientific, or educational purposes; (3) disease or predation; (4) the inadequacy of existing regulatory mechanisms; or (5) other natural or mandate factors affecting its continued existence."

Within the JSYU, 26 threatened and endangered plant species are known to exist. Another 26 have been identified as possibly existing in the unit, but their presence is not confirmed. One species, Calochortus indecorus (a species of Mariposa lily), may be extinct. In the absence of a detailed inventory specific sites cannot be identified.

Most of these species are adapted to somewhat severe habitats. They typically occur on serpentine soils, in or near seeps and bogs, or on well-drained, droughty soils and rock outcrops. Table 2-10 lists rare, endangered and unique plant species in the JSYU. If known, their general habitats are included.

2.1.2.2 Animals

Vegetation is a primary determinant of animal habitat. Each vegetation zone described in Section 2.1.2.1 contains numerous plant communities. Habitat suitability is greatly influenced by the structure and composition of these communities in addition to climate and other physical variables.

The occurrence of various successional stages in the existing coniferous forest in the JSYU is largely responsible for the diversity of animals there. Different animals may preferentially utilize different seral stages for reproduction, feeding or other life processes.

However, community structure and physical environmental features may be essentially the same within one vegetation zone and may be similar enough among zones to allow considerable faunal overlap, especially in animal populations with wide habitat tolerances.

Table 2-10

Threatened and Endangered Plants Known, or Expected, to Occur in the Josephine Sustained Yield Unit[1/]

Scientific Name	Confirmed Location	Status[2/]
APIACEAE		
Perideridia erythrorhiza	Unconfirmed	T1
Sanicula tracyi	Unconfirmed	E2,E3
Tauschia howellii	Unconfirmed	T1
ASTERACEAE		
Antennaria suffructescens	Josephine Co.; Ore. Mtn. nr Waldo	T1
Arnica viscosa	Unconfirmed	T1
Aster curtus	Unconfirmed	T1,E3
Erigeron bloomeri var. nudatus	Fiddler Mtn.; nr Cave Jct.	T1
Erigeron delicatus	Unconfirmed	E2,E3
Haplopappus racemosus congestus	Unconfirmed	T1
Lasthenia macrantha prisca	Unconfirmed	T1
Microseris howellii	Unconfirmed	T1
M. laciniata detlingii	Unconfirmed	T1
M. nutans siskiyouensis	Unconfirmed	E2,T3,D3
Senecio hesperius	Josephine Co.	T1
BERBERIDACEAE		
Vancouveria chrysantha	old Ore. Mtn. Rd.	T1
BORAGINACEAE		
Plagiobothrys hirtus corallicarpa	Unconfirmed	T1
P. h. hirtus	Unconfirmed	E2,E3
P. lamprocarpus	Unconfirmed	E2,E3
BRASSICACEAE		
Arabis aculeolata	nr Cave Jct.; nr. Hellgate; Eight Dollar Mtn.	T1
A. koehleri var. stipitata	nr Cave Jct.	T1

Refer to footnotes at end of Table.

Table 2-10 (Continued)

Scientific Name	Confirmed Location	Status[2/]
A. modesta	Rogue River canyon	E3
Arabis oregana	Old Oregon Mtn. Rd.	T1
Thlaspi montanum var. Siskiyouense	Eight Dollar Mtn.; Cow Creek	T1
CARYOPHYLLACEAE		
Arenaria paludicola	Unconfirmed	T1
CRASSULACEAE		
Sedum laxum heckneri	Onion and Fiddler Mtns.	T1
ERICACEAE		
Arctostaphylos intricata var. oblongifloia	nr Waldo	T1
Vaccinium coccinium	Unconfirmed	T1
FABACEAE		
Astragalus applegatii	Unconfirmed	T1
A. purshii var. ophiocenes	Unconfirmed (species confirmed-variety unconfirmed)	E2,E3
Sophora leachiana	Josephine Co.	T1
FUMARIACEAE		
Dicentra formosa oregana	nr Galice	E2,D3
Gentiana bisete	Illinois R.; Eight Dollar Mtn.	T1,T3
HYDROPHYLLACEAE		
Phacelia capitata	Unconfirmed	E2,E3
P. verna	Josephine County; Cow Creek	T1
LAMIACEAE		
Monardella purpurea	Rogue River; nr Cave Jct. & Waldo	T1
LILIACEAE		
Calochortus indecorus	Sexton Mtn.	E2,E3 (possibly extinct)
Erythronium howellii	Grasslands; nr Cave Jct.	T1
E. oregonum	Unconfirmed	T1

Refer to footnotes at end of Table.

Table 2-10 (Continued)

Scientific Name	Confirmed Location	Status[2/]
Lilium occidentale	Unconfirmed	E2,E3
L. vollmeri	Unconfirmed (hillside bogs)	Tl
L. wigginsii	Unconfirmed (hillside bogs)	Tl
L. washingtonianum var. minus	Unconfirmed (variety unidentified)	Tl
Schoenolirion bracteosum	Bogs, Serpentine Soils; Eight Dollar Mtn.	Tl
LIMNANTHACEAE		
Limnanthes gracilis gracilis	Unconfirmed (seeps)	Tl
MALVACEAE		
Sidalcea malvaeflora elegans	Deer Crk; nr Applegate	Tl
S. setosa	Unconfirmed	Tl
ORCHIDACEAE		
Cypripedium californicum	Bogs; seeps, Eight Dollar Mtn.; nr Cave Jct. Cow Creek	Tl
PORTULACACEAE		
Lewis cotyledon	Whiskey Creek	Tl
L. oppositifolia	Bogs; serpentine outcrops, Eight Dollar Mtn.; Illinois R.	Tl
SARRACENIACEAE		
Darlingtonia California	Bogs; seeps; streams on serpentine	Tl
SCROPHULARIACEAE		
Castilleja brevilobata	Eight Dollar Mtn; nr Selma	Tl
Pedicularis howellii	Southern Josephine Co.	Tl
Synthyris missurica hirsuta	Unconfirmed	E2,E3

1/ Drawn from lists published by US Fish and Wildlife Service (Federal Register, 1975 & 1976) & the Oregon Threatened & Endangered Species Task Force (1976).

2/ Status:

Tl - Listed as Threatened: USDI, FWS, 1975 Fed. Reg. 40 (127):27828-27924.

E2 - Listed as Endangered: USDI, FWS, 1976 Fed. Reg. 41 (117):24524-24572

E3 - Considered Endangered: Oregon Threatened and Endangered Species Task Force, August, 1976.

D3 - Recommended for Deletion by Oregon Threatened and Endangered Species Task Force, August, 1976.

Tables 2-11 and 2-12 present lists of selected mammals and birds, respectively, of potential occurrence in the four major vegetation zones of the JSYU. Forest seral stages utilized are listed for each species. The assignment of the species to vegetation zones is based on studies in southwestern Oregon reported by Bailey (1936) and Browning (1975). The assignment of species to seral stages is based on studies conducted in the Blue Mountains of northeastern Oregon, reported by Thomas et al. (1977). The tables are by no means complete listings of all the animals in the area.

Reptiles and Amphibians

Twenty-two species of reptiles and amphibians are known to occur in the JSYU. It is impossible to assign most of these species to vegetation zones because of the inadequacy of available data.

Mammals

Game Mammals

The Oregon Wildlife Code (1976) lists the antelope, black bear, cougar, deer, elk, moose, mountain goat, mountain sheep, and silver gray squirrel as game mammals. However, not all of these occur in the planning area.

Black-Tailed Deer. The black-tailed deer is distributed throughout the SYU wherever habitat conditions are suitable. All lands within the sustained yield unit are considered to be deer habitat or potential habitat except for those lands in roads, homesites or cities.

Deer in this area do not migrate latitudinally but move between summer (higher altitude) ranges and winter (lower altitude) ranges. Summer range in the SYU generally lies above 2,500 feet and winter range below it. Lands below 1,500 feet elevation are considered year-long deer habitat. Winter range and year-long range are limited within the area, whereas summer range is fairly abundant (Figure 2-9).

Food, water and cover are good to excellent over most of the area. Highest winter deer densities are on southwest slopes because of increased sunlight, highly palatable and nutritious forage, and light snowpack. Consequently many of these areas are severely over-utilized. Thermal cover is an important segment of deer habitat. It serves as an aid "in ameliorating the effects of ambient air temperature, radiational heat loss and insulation that tend to raise or lower body temperatures beyond normal levels" (Thomas et al. 1976). Thermal cover is adequate over most of the SYU but is restricted in portions of crucial winter range. Two examples of this are portions of the Grave Creek and McMullin Creek drainages. Human intrusions such as extensive road networks, residential development and recent timber harvests reduce hiding cover and may form barriers that prevent deer movements between desirable habitats.

Black-tailed deer populations in the SYU have declined within recent years. The severe winter of 1968-1969 caused considerable mortality in a short time. Habitat modifications, such as fire control, road construction, improved silvicultural systems and changing private land use patterns, undoubtedly have a greater combined effect on the decline of the deer population over a long time.

Table 2-11
Selected Mammals of the JSYU

	MAMMAL SPECIES	Vegetation Zone: Interior Valleys	Douglas Fir/ hardwoods	Mixed Conifer	White fir	Forest Seral Stage(s) Utilized: Grass/forb	Shrub/seedling	Pole/sapling	Young 2nd growth	Mature	Old growth
	Water shrew				+	XO	XO	XO	XO	XO	XO
	Coast mole		+	+		XO	XO	XO	XO	XO	XO
	Long-eared myotis		+	+		O	O	O	O	XO	XO
	Big brown bat		+	+		O	O	O	O	XO	XO
	Black-tailed jackrabbit	+	+	+		XO	XO				
	Snowshoe hare		+	+	+	O	XO	XO	XO	X	
	Brush rabbit		+	+		O	XO	XO			
	Beaver	+	+	+	+	XO	XO	XO	XO	XO	XO
	Yellow-bellied marmot		+	+	+	XO	XO				
	Townsend's chipmunk		+	+		XO	XO	XO	XO	XO	XO
	Bobcat	+	+	+	+			XO	XO	XO	XO
	Black bear		+	+	+	O	XO	XO	XO	XO	XO
	Coyote	+	+	+	+	XO	XO	XO	XO	XO	XO
	Red fox				+	XO	XO	XO	XO	XO	XO
C	Raccoon	+	+	+		O	O			XO	XO
C	Marten		+	+	+			O	O	XO	XO
	Spotted skunk	+				XO	XO	XO			
	Badger	+	+	+		XO	XO	XO	XO	XO	XO
	Cougar		+	+	+	O	XO	XO	XO	XO	
C	Silver gray squirrel	+	+	+				XO	XO	XO	XO
	Northern flying squirrel		+	+	+				XO	XO	XO
C	Western harvest mouse	+	+	+		XO	XO	XO	XO	XO	XO
C	Deer mouse	+	+	+		XO	XO	XO	XO	XO	XO
	Bushy-tailed wood rat		+	+		XO	XO	XO	XO	XO	XO
	Muskrat		+	+		XO	XO	XO	XO	XO	XO
	Mink		+	+		XO	XO	XO	XO	XO	XO
	River otter		+	+		XO	XO	XO	XO	XO	XO
	Roosevelt elk	+	+	+		O	XO	XO	O	O	O
	Black-tailed deer	+	+	+		O	XO	XO	O	O	O

Key: + = present
X = reproduction
O = feeding
C = cavity users

Source: Adapted from Thomas et al. (1977) and Bailey (1936)

Table 2-12

Selected Birds of the JSYU

SPECIES	Cavity nester	Resident	VEGETATION ZONE: Interior valley	Douglas fir/ hardwoods	Mixed conifer	White fir	SERAL STAGE: Grass/forb	Shrub/seedling	Pole/sapling	Young second growth	Mature	Old growth
Goshawk		P		+	+	+		O		O	XO	XO
Red-tailed hawk		P	+	+	+		O	O	O	XO	XO	XO
Golden eagle		P	+	+	+	+	O	O	O	O	XO	XO
Bald eagle		P	+	+	+		O	O			XO	XO
Osprey		P	+	+	+						X	X
Blue grouse		P		+	+	+	O	XO	XO	O	O	O
Ruffed grouse		P	+	+	+			XO	X	O	XO	XO
California quail		P	+	+	+		O	XO	XO	XO		
Mountain quail		P	+	+	+		O	XO	XO	XO		
Killdeer		P	+	+	+	+	XO					
Screech owl	+	P		+	+		O	O		X	XO	XO
Great horned owl		P	+	+	+		O	O	O	XO	XO	XO
Spotted owl	+	P		+	+	+					XO	XO
Pileated woodpecker		P		+	+	+					XO	XO
Black-backed three-toed woodpecker		P				+				XO	XO	XO
White-headed woodpecker	+	P		+	+						XO	XO
Vaux's swift	+	B			+	+					XO	XO
Olive-sided flycatcher		B				+	O	O		XO	XO	XO
Violet-green swallow		B		+	+	+	O	O		X	X	XO
Cliff swallow		B	+	+	+		O	O	O	O	O	O
Mountain chickadee	+	P		+	+	+			XO	XO	XO	XO
White-breasted nuthatch	+	P	+	+	+						XO	XO
Dipper		P		+	+	+	XO	XO	XO	XO	XO	XO
Winter wren		P		+	+			XO	XO	XO	XO	XO
Swainson's thrush		B		+	+	+	O	XO	XO	O	O	O
Western bluebird	+	P	+	+	+		O	O		X	X	X
Ruby-crowned kinglet		P			+	+			O	O	XO	XO
Cedar waxwing		P			+	+			XO	XO	XO	XO
Solitary vireo		B		+	+				XO	XO	XO	XO
Nashville warbler		B			+	+			XO	O	O	
Hermit warbler		B			+	+			XO	XO	XO	XO
Brewer's blackbird		P	+				O	XO	XO	XO	XO	XO
Western tanager		B			+	+		O	O	XO	XO	XO
Purple finch		P		+	+			O	O	XO	XO	XO
House finch		P	+				O	O	O	XO	XO	O
Rufous-sided towhee		P		+	+			XO	XO	XO	XO	XO
Savannah sparrow		P	+				XO	O				
Dark-eyed junco		P	+	+	+		XO	XO	XO	XO	XO	XO
White-crowned sparrow		P	+	+	+		XO	XO	XO	XO	XO	XO
Fox sparrow		P		+	+			XO	XO	XO	XO	
Song sparrow		P	+					XO	XO	XO	XO	

Key:
+ - Present
P - Permanent
B - Breeding
X - Reproduces
O - Feeds

Source: Adapted from Browning (1975); Thomas et al. (1977); and Meslow (1978).

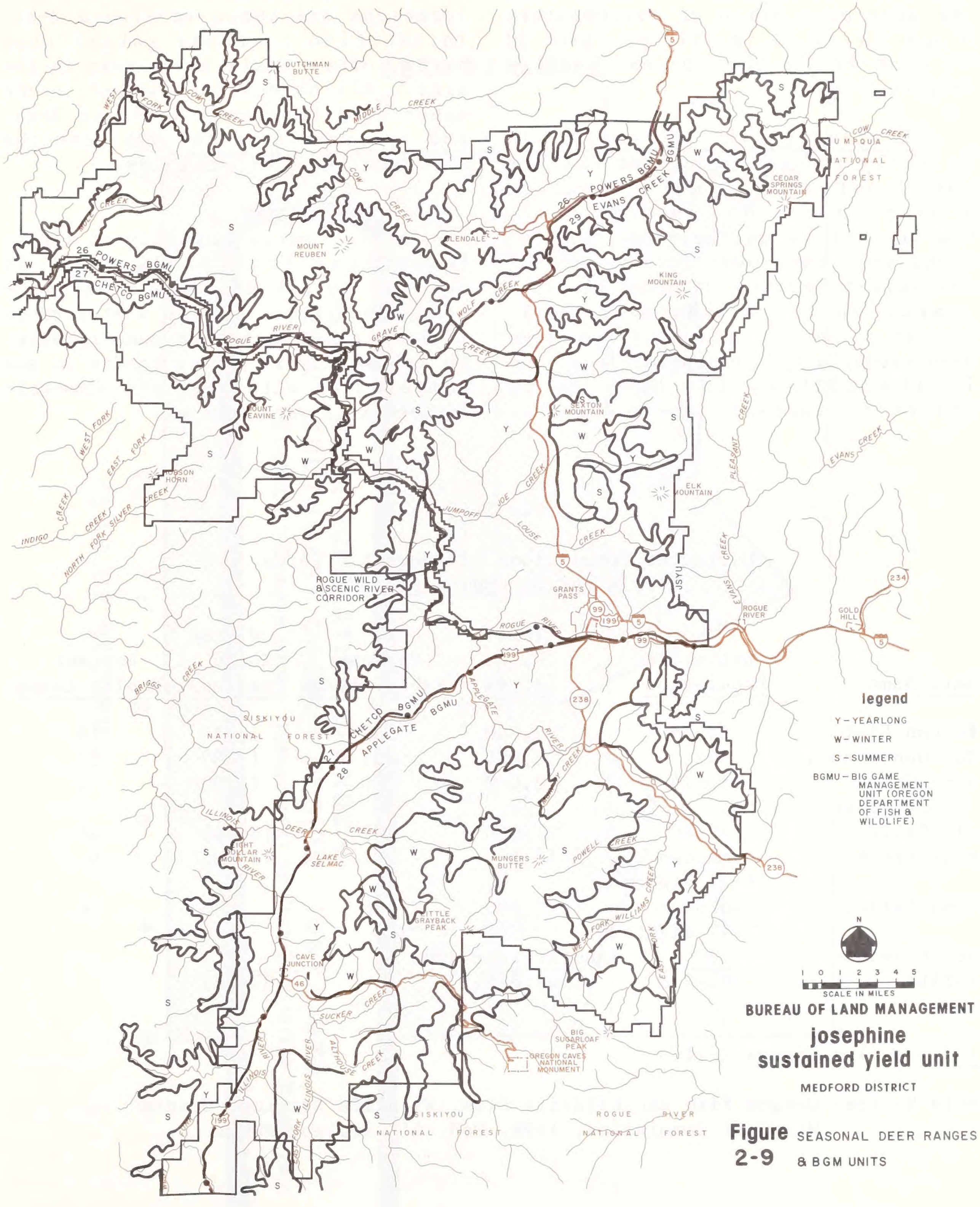


Figure 2-9 SEASONAL DEER RANGES & BGM UNITS

The Oregon Department of Fish and Wildlife (ODFW) estimates that the deer population of southwestern Oregon declined in 1975 by about 20 percent below the 10-year average (Figure 2-10).

Roosevelt Elk. Roosevelt elk probably ranged throughout most of the Coast and Klamath Mountain provinces in the historic past. However, it is unlikely that populations were ever very large. In 1910 the Forest Service reported elk were scarce in the Siskiyou National Forest. In recent years elk have been transplanted to several locations in the JSYU by the ODFW in an effort to increase their numbers.

Herd names and estimated populations are given in Table 2-13; herd locations are shown in Figure 2-11. In addition to these established herds, other small herds roam in the area. Elk have been sighted in the upper Bull Run-Green Mountain Area, and two were seen in 1976 near the headwaters of Williams Creek.

Winter range, usually at elevations less than 2,500 feet, is crucial to elk during winters with heavy snowpack. Because winter range is less extensive than summer range, it is usually in poorer condition and competition with deer and domestic livestock is more severe.

Table 2-13

Estimated Populations of Known Elk Herds Within the Josephine SYU 1/

Herd Name	Estimated Population	Total Range (acres)	Percent Public Lands	Winter Range (acres)	Percent Public Lands
Beacon Hill	12-15	7,840	35	1,080	19
Fortune Branch	22	13,000	31	1,789	27
Bear Creek-Buck Ridge	13-14	3,000	50	1,790	54
Elk Valley	75-80	21,000	49	16,040	44
Mule Creek	unknown (6-12 sighted)	17,000	92	10,280	90
Eden Valley	unknown (45 sighted)	4,000	88	880	56
Mt. Peavine	30	Insufficient data			
TOTALS	203-218	65,840		31,859	

1/ See also Figure 2-11.

Main Source: Oregon Fish and Wildlife Plan, Wildlife Section, Oregon Wildlife Commission, 1974. Fed. Aid Project FWO/R.

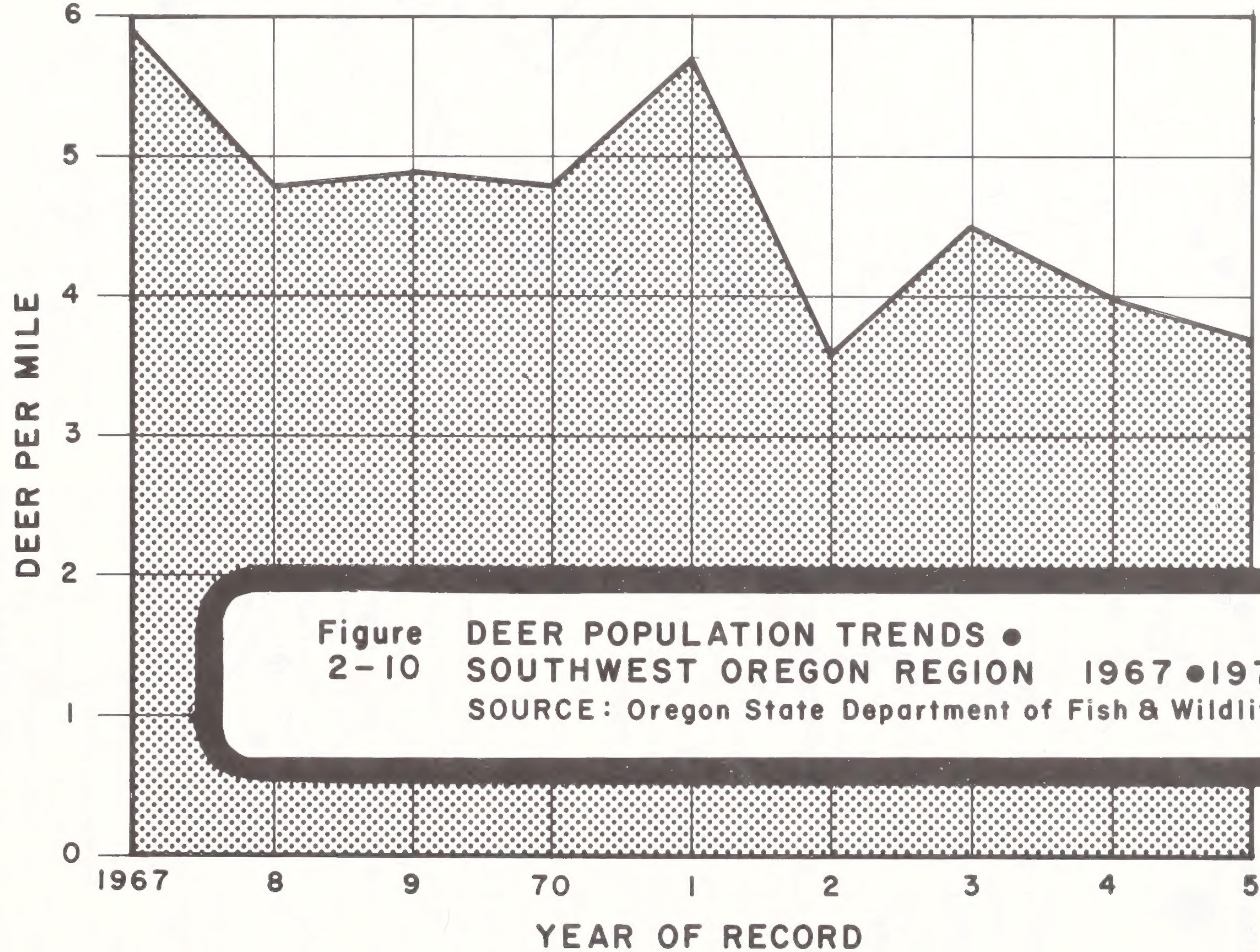
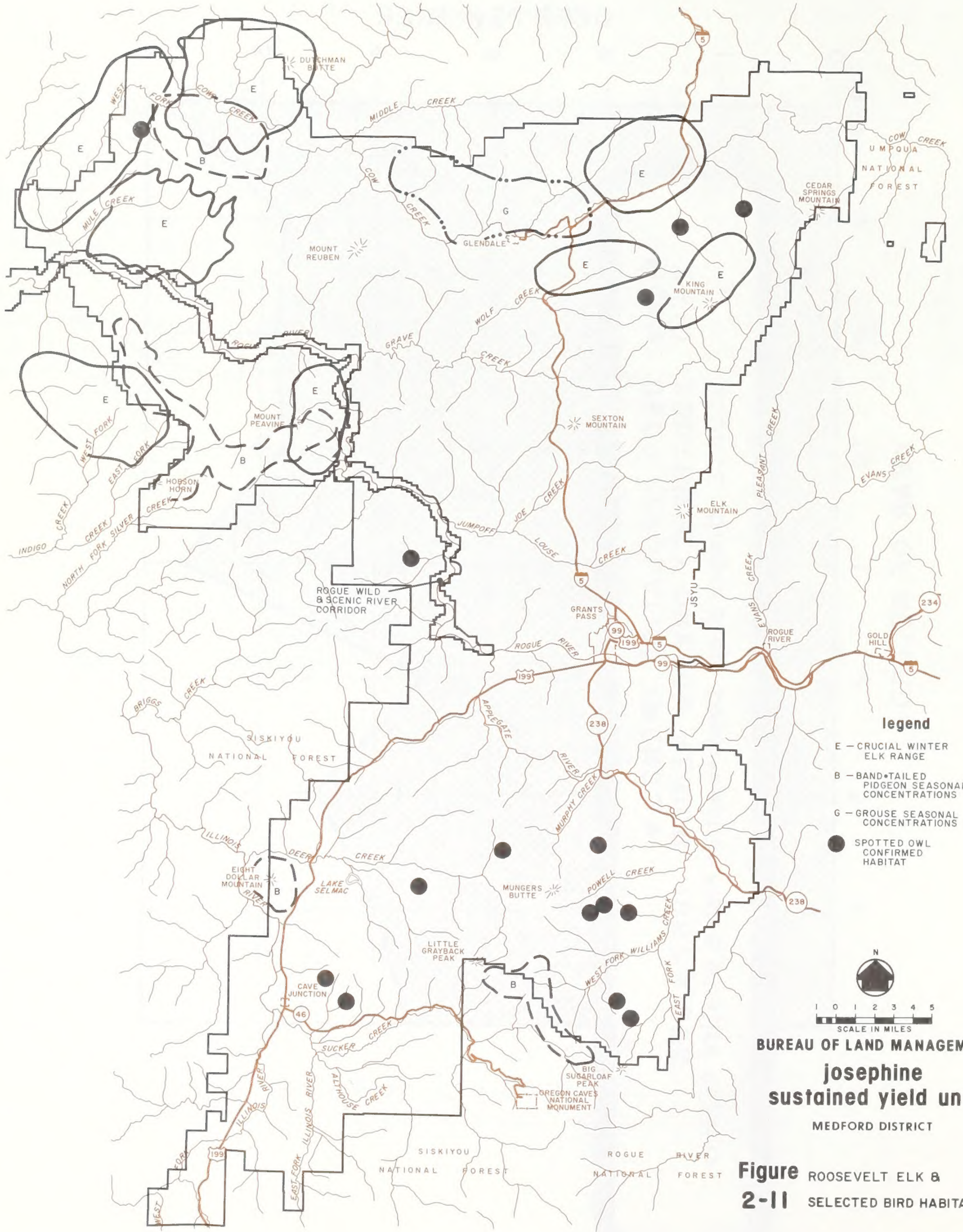


Figure 2-10 DEER POPULATION TRENDS • SOUTHWEST OREGON REGION 1967 • 1975

SOURCE: Oregon State Department of Fish & Wildlife Reports



BUREAU OF LAND MANAGEMENT

josephine sustained yield unit

MEDFORD DISTRICT

Figure 2-11 ROOSEVELT ELK & SELECTED BIRD HABITATS

Water availability is satisfactory for elk, but adequate cover is sometimes scarce. Thermal cover has been reduced in some preferred use areas and is considered a limiting factor at least on the Peavine Mountain winter range. Because Roosevelt elk restrict their home ranges to areas seldom exceeding 2 to 3 square miles (Harper 1971), they are extremely vulnerable to habitat changes involving localized areas. The combination of successive clearcuts and extensive partial cuts coupled with intensified road construction has reduced the amount of cover in many preferred elk use areas. Although clearcutting may vastly increase forage abundance, it is necessary for elk to have the protection offered by dense cover closely adjacent to the clearcut.

Black Bear. Black bears are found throughout the Josephine SYU, and their population appears to be stable or slightly on the increase. Although no population trend data is available for the unit. The ODFW estimated a population of approximately 1,180 bears in Josephine County in 1970. Habitat conditions over most of the SYU are considered good to excellent. The steep, rocky cliffs above the Rogue River provide excellent denning areas, and the roadless region in the "wild" section of the river complements the natural bear habitat.

Mountain Lion (Cougar). The cougar is a resident of the inaccessible mountainous forests of the area and is usually closely associated with elk or deer herds, as they are a major portion of the predator's diet. The ODFW estimated (1974) that there were approximately 660 cougars in Josephine County in 1970. The cougar population in the Rogue Canyon was estimated at approximately 15 animals (ODFW 1971). Populations appear to be stable or slightly increasing in southwestern Oregon (Gale 1973), a trend that may be attributed largely to the designation of the cougar as a game animal instead of a predator.

Silver Gray Squirrel. The silver gray squirrel is found throughout the Josephine SYU, with highest population in the mixed conifer forest. These squirrels are especially abundant in the serpentine area of Mt. Peavine, the Whiskey Creek-Mt. Reuben area and the low foothills of the Illinois Valley. Little data are available on population trends, but field observations indicate that the population is stable.

Furbearers

The Oregon wildlife code lists the beaver, fisher, marten, mink, river otter, raccoon and bobcat as furbearers in the State. Annual trapping records furnish excellent information on the distribution of these animals. However, these data cannot be applied in determining population trends because high fur prices increase trapping effort while a depressed market generally decreases effort.

In addition to those animals officially listed as furbearers by the State, the coyote, red fox, skunk, and muskrat are valued for their fur. These animals are unprotected by official trapping regulations. Recent increases in fur prices have brought about an associated increase in trapping efforts for all furbearing species.

Non-Game Mammals

Mammals other than those discussed under game or furbearers are considered non-game. Some of these are fully protected by statute or regulation. Those in this category that inhabit the planning area include golden-mantled ground squirrel, chipmunk, chickaree, flying squirrel, fisher, ring-tailed cat and pika. Other mammals not listed are not protected at any time. Examples of these are rats, mice, rabbits, coyotes and bats. Little data exists on distribution and abundance of non-game mammals in the planning area.

Birds

The bird life of the JSYU contains species of various types, e.g., raptors, seed eaters, and insectivorous feeders. Table 2-12 lists representative types in addition to those discussed below.

Upland Game Birds.

Naturally occurring upland game birds include California quail, mountain quail, blue grouse, ruffed grouse, mourning dove, and band-tailed pigeon. The following briefly addresses a few of these species.

Mountain Quail. The mountain quail is a non-migratory resident found throughout the Josephine unit in mountainous regions. Brushy openings in forested areas are preferred habitat. During periods of snow cover, mountain quail are forced to lower elevations and compete for food with California quail.

Population trend data, collected along big game census routes indicated a population density of 2.23 mountain quail per census mile in 1975. In 1974 the estimated population was 1.05 per mile (ODFW 1976a).

Blue Grouse. Blue grouse are the most common and widespread grouse in the unit. They are non-migratory and seasonally associated with the higher elevation white fir community and with clearcut areas. Clearcuts are utilized primarily during late summer and autumn when ripe fruits are available. Basic habitat components for these grouse appear to be adequate in the unit.

The 1975 road census conducted by Oregon Department of Fish and Wildlife showed an average of .11 blue grouse per mile in the southwestern region of Oregon, an increase of .05 over 1974.

Oregon Ruffed Grouse. The ruffed grouse is a year-round resident of the mixed evergreen, deciduous and riparian forests. Preferred habitat is meadow areas intermingled with forests. While the amount of suitable habitat is adequate within the SYU, the population is low and fluctuates widely every year, as do populations of other species of grouse.

Band-Tailed Pigeon. Band-tailed pigeons may occasionally be found in autumn within the forests of the Josephine SYU. Some nesting may occur in the region but most nesting activity occurs west of the SYU in the Coastal Forest region of the state. Clearcut units and fruit-producing hardwood areas located near ridge passes are heavily utilized by pigeons, especially during migrations.

No local population concentrations of pigeons are known within the Josephine unit. Data collected by ODFW (1975) at Mineral Springs and

tide-flat concentration areas, outside the Josephine Unit, show a 39 percent increase in the pigeon population since 1974.

Fishes

The aquatic habitats of the Josephine SYU support diverse populations of game and non-game fish species. Cold water anadromous fishes (fishes that are reared in fresh water, migrate to the ocean and return to fresh water to spawn) are especially well represented with six species. Two species of cold water resident game fish and four species of warm water game fish are also represented in the area. Ten species of non-game fish have been identified in the unit (see Table 2-14).

Approximately 202 miles of Class I and 188 miles of Class II streams of direct importance to fisheries flow through public lands in the Josephine SYU. "Class I streams" are defined by the State of Oregon as waters which are valuable for domestic use, are important for angling or other recreation and/or are used by significant numbers of fish for spawning, rearing or migration routes. Streamflows in Class I

Table 2-14

Fishes Identified in the Josephine SYU

I. Game Fish

A. Cold Water Anadromous
- Summer steelhead
- Winter steelhead
- Spring chinook salmon
- Fall chinook salmon
- Coho salmon
- Sea-run cutthroat trout
- American shad
- White sturgeon
- Green sturgeon

B. Cold Water Resident
- Rainbow trout
- Resident cutthroat trout

C. Warm Water Resident
- Brown bullhead catfish
- Largemouth bass
- Black crappie
- Bluegill

II. Non-Game Fish
- Pacific lamprey[1/]
- Carp
- Redside shiner
- Blackside dace
- Squawfish[2/]
- Klamath small scale sucker
- Coastrange sculpin
- Prickly sculpin
- Reticulate sculpin
- Threespine stickleback

[1/] Lamprey are not true fishes.
[2/] Not found in the Rogue Drainage.

streams may be either perennial or intermittent.

"Class II streams" are defined as any headwater streams or minor drainages that generally have limited or no direct value for angling or other recreation. They are used by few, if any, fish for spawning or rearing. The principal value of Class II streams lies in their influence on water quality or quantity in Class I waters downstream. Figure 2-12 shows locations of Class I stream habitats.

Cold Water Game Fishes

Anadromous Game Fishes. The anadromous game fishes are the most economically important fishes in the Josephine SYU. The anadromous species of the unit are the coho salmon, chinook salmon, steelhead, sea-run cutthroat, American shad and the white sturgeon. In addition to their significance within the unit, the fall chinook and coho salmon spawned in the SYU are of considerable importance to the ocean sport and commercial fisheries. The recreational importance of the anadromous population is discussed in Section 2.1.3.1.

As shown in Table 2-15, the majority of salmonid habitat in the JSYU is in poor to fair condition and declining in quantity. Table 2-16 shows annual anadromous game fish population status for major waters within the SYU. Many streams are now stocked with hatchery-raised fish in attempt to augment natural populations.

Resident Game Fishes. Resident cold water game fishes in the Josephine are the rainbow trout and the cutthroat trout. Both species are abundant in the main stem of Cow Creek and in practically all headwaters of tributary streams in the area. While their range overlaps that of steelhead and salmon in many streams, native resident populations are found predominantly upstream of their anadromous counterparts. As with anadromous forms, resident salmonids are very intolerant of habitat changes. The ODFW stocks the Rogue drainage annually with about 93,000 rainbow and cutthroats. Resident trout populations are considered stable in all JSYU waters except the Applegate River, where they are declining.

Warm Water Game Fishes

Populations of largemouth bass, bluegill, pumkinseed sunfish, green sunfish, brown bullhead, and black crappie are restricted to sloughs and reservoirs within the Josephine unit. None of these species is indigenous to western Oregon; all have been introduced as game fish. Whereas trout and salmon prefer cold, fast-moving waters, warm water species prefer quiet, warm waters. Neither group can thrive in the other's habitat. Warm water species have not increased significantly because suitable habitat is limited.

Non-Game Fishes

Nearly all moderate or low elevation streams in the unit support non-game fish. Redside shiners, suckers, and carp are particularly abundant. Many non-game species are important as scavengers of stream detritus, aquatic plants, or invertebrates. Some non-game fishes are fed upon by game fishes. Although moderate populations of non-game native fishes are important to the aquatic ecosystem, stream alterations

Figure 2-12 CLASS I STREAMS

Table 2-15

Salmonid Fish Species Habitat and Current Status
Josephine SYU

Species	Habitat Type	Stream Miles[1/] (Total)	Stream Miles[1/] (Public)	Habitat (Quality)	Status[2/] (Quantity)
	adult migration	216.5	76.7	fair	stable
Summer	spawning	135.7	42.2	fair	decreasing
Steelhead	rearing	193.1	76.7	poor	decreasing
	juvenile migration	216.5	76.7	poor	decreasing
	adult migration	450.7	114.2	good	stable
Winter	spawning	435	112.2	fair	decreasing
Steelhead	rearing	339	107	poor	decreasing
	juvenile migration	418	112	poor	decreasing
	adult migration	59	34.5	poor	decreasing
Spring	spawning	6	0	fair	stable
Chinook	rearing	6	0	fair	stable
Salmon	juvenile migration	59	34.5	good	stable
	adult migration	178	54	fair	stable
Fall	spawning	178	54	fair	stable
Chinook	rearing	56	8	poor	decreasing
Salmon	juvenile migration	178	54	fair	stable
	adult migration	376	95	good	stable
Coho	spawning	376	95	good	stable
Salmon	rearing	301	114	poor	decreasing
	juvenile migration	376	114	poor	decreasing
	adult migration	451	114	good	stable
Sea-run	spawning	382	78	fair	decreasing
Cutthroat	rearing	339	107	poor	decreasing
	juvenile migration	418	112	poor	decreasing
Resident	spawning	574	185	fair	decreasing
Cutthroat	rearing	332	150	fair	decreasing
Resident	spawning	339	77	fair	decreasing
Rainbow	rearing	356	167	fair	decreasing

1/ Class I stream environment
2/ Based on 1965-75

Table 2-16

Anadromous Game Fish Population Status

Stream Section	Species	Status
Rogue River (Mouth of Applegate River to Savage Rapids Dam)	Spring chinook	stable
	Fall chinook	stable
	Coho	decreasing
	Summer steelhead	stable
	Winter steelhead	stable
Rogue River and tributaries from Mule Creek to Applegate River	Spring chinook	decreasing
	Fall chinook	stable
	Coho	decreasing
	Summer steelhead	stable
	Winter steelhead	stable
	Sturgeon	stable
Rogue River and tributaries from Applegate River to Upper Limits of anadromous fish (Not including Applegate River drainage)	Spring chinook	decreasing
	Fall chinook	stable
	Coho	decreasing
	Summer steelhead	stable
	Winter steelhead	stable
Rogue River[1/] (north-side tributaries--Marial to Grave Creek)	Summer steelhead	stable
Umpqua River[1/] (Cow Creek and tributaries--West Fork to Anchor)	Fall chinook	decreasing
	Coho	decreasing
	Winter steelhead	stable
Illinois River Drainage (inside Resource Area)	Fall chinook	stable
	Coho	
	Winter steelhead	stable
Applegate River Drainage (inside SYU)	Fall chinook	stable
	Coho	decreasing
	Summer steelhead	decreasing
	Winter steelhead	decresing

[1/] Closed to angling by Oregon Department of Fish and Wildlife due to stream's importance as spawning bed.

Source: Oregon Department of Fish and Wildlife estimates.

such as water withdrawals and removal of riparian vegetation have created conditions favoring the survival of non-game species over cold water game species.

Invertebrates

The invertebrates are the predominant group of animals in the SYU. In spite of their recognized abundance and ecologic significance as decomposers, plant pests and prey species in aquatic and terrestrial food webs, little information is available on invertebrate populations indigenous to the SYU. For this reason, the following general discussion will be limited to the major invertebrate groups suspected to occur in the area and for which ecologic interrelationships have been documented in other geographic areas.

Terrestrial Invertebrates

Some type of invertebrate fauna occupies all available niches from below the soil surface to the tops of the forest canopy.

Non-Arthropods, such as nematodes and earthworms, are the most numerous invertebrates in soil, while arthropods are more abundant above the soil, especially in the litter/duff layer on the forest floor.

The undersides of stones and rotten logs provide special microhabitat for a variety of invertebrates including snails and slugs, centipedes, millipedes, springtails, earwigs, and certain beetles. Many common soil animals are also found in special tree hole forest microhabitat (Kendeigh 1961).

The air space and vegetation above the soil may be considered the upper strata available to terrestrial invertebrates. The majority of upper strata invertebrates are Arthropods, a group that includes insects. Many of these animals feed on living plant materials, both foliage and stems, while others are predaceous, parasitic or scavenging.

Forest Insects of Economic Significance. Aerial reconnaissance by the Forest Service in 1976 showed 81 minor insect outbreaks in the SYU, involving six species. Most of the outbreaks affected fewer than ten trees each. Table 2-17 tabulates the 81 outbreaks by insect species and host tree.

Aquatic Invertebrates

Most of the waters within the Josephine SYU provide habitat for large numbers of invertebrates. Insects are probably dominant although various rotifers, nematodes, crustaceans and helminths may be locally more numerous.

Macroinvertebrate (invertebrates which are visible to the eye) data are not available for most of the streams in the SYU. However, some studies have been performed on the Upper Rogue River (Walsh 1973) and the South Umpqua Basin (Stansbury 1976) which should be representative of conditions within the SYU. As shown in Table 2-18, diversity is relatively high and indicative of clean water conditions.

Threatened and Endangered Species

An endangered species is defined by Public Law 93-205, as "any species which is in danger of extinction throughout all of a significant

Table 2-17

Summary of Known Insect Outbreaks in 1976 Josephine Sustained Yield Unit

Insect	Host Trees	Number of Outbreaks
Douglas-fir Beetle	Douglas-fir	19
Fir Engraver	True firs	3
Mountain Pine Beetle	Ponderosa Pine	9
	Sugar Pine	16
	Western White Pine	1
Western Pine Beetle	Ponderosa Pine	10
Flathead Wood Borer	Douglas-fir	18
	Ponderosa Pine	2
Knobcone Pine Sawfly	Knobcone Pine	3
		81

Source: USFS Forest Insect Survey Maps

Table 2-18

Major Aquatic Insect Groups of Known Occurrence in the Upper Rogue River and the South Umpqua Basin

Order	Number of Families	
	South Umpqua Basin	Upper Rogue River 2/
Ephemeroptera (Mayflies) 1/	8	3
Plecoptera (Stoneflies) 1/	8	5
Odonata (Dragonflies)	6	1
Trichoptera (Caddisflies)	16	3
Hemiptera (True bugs)	6	1
Coleoptera (Beetles)	7	3
Diptera (Flies, mosquitos, midges)	19	4
Megaloptera (Dobsonflies)	2	0
Lepidoptera (Moths, butterflies)	1	1

1/ Considered indicative of clean water
2/ Benthic forms only

Sources: Stansbury 1976; Walsh 1973.

portion of its range." A threatened species is defined as "any species which is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range." State of Oregon regulations use the same language but add the qualifier "in Oregon."

The bald eagle is the only species, listed as threatened, known to regularly occur within the JSYU. Two nests, active in recent years, have been identified in the Buckhorn Mountain area (Nature Conservancy 1977). BLM and ODFW personnel were unable to verify during the 1978 field season. One endangered species, the peregrine falcon, can be considered of potential occurrence though none have been observed in the general area in recent years (Browning 1975). In addition, the northern spotted owl, listed by the State of Oregon as a threatened species, is a permanent resident of the planning area. Known habitat locations are indicated in Figure 2-11.

When a species is being examined to determine if it meets the requirements for either threatened or endangered classification, a notice is published in the Federal Register requesting data and advising that this species is being considered for inclusion. This process is called Notice of Status Review. Three species found in the planning area are currently on this list. Bobcat and river otter are known to be present in areas where suitable habitat exists; however their population status is unknown. The Siskiyou Mountain salamander uses talus area within old growth coniferous forests (Nussbaum 1974). The only verified locations are outside but adjacent to the SYU in the Thompson Creek drainage. Table 2-19 lists species of special status.

Table 2-19

Threatened, Endangered, or Special Status Species of Known or Potential Occurrence in the SYU.

Species	Federal Status	Oregon Status
Siskiyou Mountain salamander	N	
Plethodon stormi		
Peregrine falcon	E	E
Falco peregrinus anatum		
Bald eagle	T	T
Haliaetus leucocephalus		
Northern spotted owl		
Strix occidentalis caurina		T
River otter	N	
Lutra canadensis		
Bobcat		
Felis rufus	N	

E = Endangered
T = Threatened
N = Notice of Status Review

Critical Habitat

No habitat considered critical under Section 7 of the Endangered Species Act of 1973 has been declared or nominated within the State of Oregon.

2.1.3 Social Environment

In this section are grouped categories of data descriptive of human behavior including the social, cultural, and economic aspects. This is the "people" discussion of Josephine SYU, as opposed to the non-living physical and non-human biological data previously displayed. The discussion of social environment in the present context may be contrasted with the final section on existing land use. Both portray obvious evidence of human action on, and interaction with, the environment. The term "social environment" as used here is intended to give strong consideration to human sensitivities. The land use discussion addresses use allocations applicable to limited land resources.

2.1.3.1 Recreation

Within or near the Josephone SYU are Oregon Caves National Monument, Crater Lake National Park, Wild Rogue, and Kalmiopsis Wilderness Areas, and the Rogue National Wild and Scenic River, one of the eight initial components of the National Wild and Scenic River System created by Federal legislation in 1968. The Illinois River is a State Scenic Waterway and has been recommended in part for inclusion into the National River System (Figure 2-13).

Recreation Within the Josephine Sustained Yield Unit

Most of the Josephine SYU is within the Rogue River Basin, which is widely known for the variety and quality of its recreation resources. The Rogue River has become increasingly popular for fishing, boating, hiking and enjoying natural beauty. The surrounding Klamath Mountains provide a rugged, scenic area for hunting, hiking, camping, sightseeing, picnicking and riding off-road vehicles (ORVs). Many facilities and services are available for the comfort and convenience of tourists and recreationists.

Within the SYU are located 31 of the 33 parks composing the Josephine County park system, as well as two Douglas County parks. Illinois River Forks State Park and the Rough and Ready State Wayside are also within the SYU. Seven of the county parks and the State park are on public lands, leased from BLM under provision of the Recreation and Public Purposes Act of 1926 (R&PP), as amended. BLM administers four campgrounds within the JSYU in addition to facilities associated with management of the Rogue Wild River. Figure 2-14 shows the location of all public recreation sites throughout the unit. Table 2-53 delineates acreage, management, and authority for each of these tracts. Private interests provide overnight lodging, eating facilities and guided boat rides on the Rogue River.

Overall use of the river basin is increasing. After a sharp reduction in visitor use during the gasoline-short years of 1973 and 1974, attendance at Illinois River Forks State Park has again been increasing. This park recorded

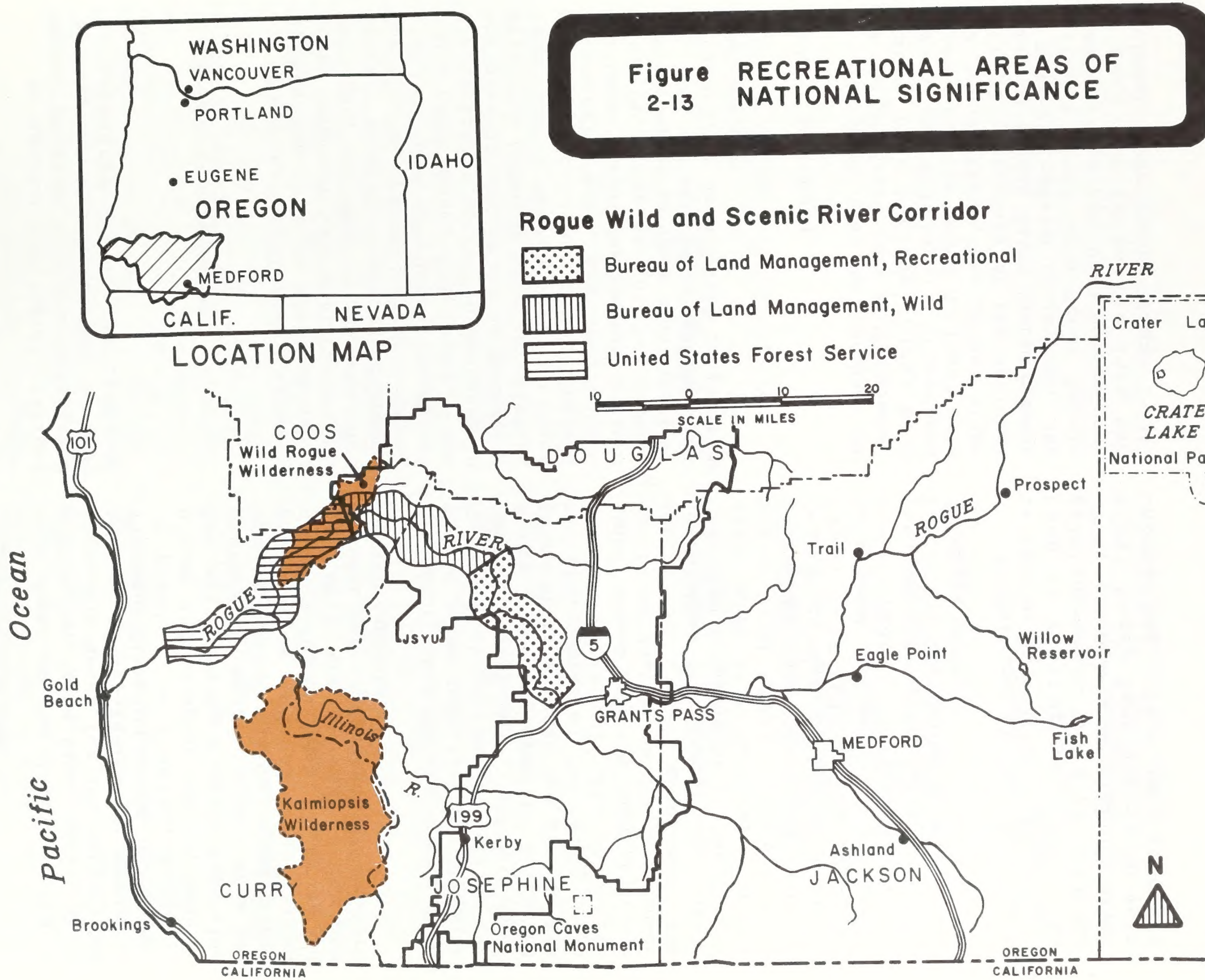


Figure 2-13 RECREATIONAL AREAS OF NATIONAL SIGNIFICANCE

123,000 visitor days in FY 1975, an 86 percent increase over FY 1974 and a 58 percent increase over the pre-shortage period, FY 1971 (Oregon Department of Transportation 1976b).

Visits to the Josephine County parks within the SYU totaled more than 560,000 in 1975, an increase of more than 10 percent over 1974. The number of paid campers increased by 12 percent during the same period (Josephine County Parks, 1975 Attendance Sheet). Josephine County Park Board data also show that approximately 48 percent of the visitors are from other states, the majority from California. Within the SYU, Josephine County received an estimated 117 million visits (i.e., activity occasions) in 1975 (Oregon Department of Transportation 1976a).

Recreation Related to Public Lands

Varied activities are available to recreationists on public lands within Josephine SYU. Much recreation takes place on or near the Rogue River, which is discussed separately.

Overview of the Rogue Wild & Scenic River

An 84-mile segment of the Rogue was designated a component of the National Wild and Scenic River System in 1968. The designated section administered by BLM is entirely within the JSYU, extending from the mouth of the Applegate River downstream approximately 47 river miles to the east boundary of the Siskiyou National Forest near Marial. The remainder of the Rogue Wild and Scenic River, approximately 37 river miles from the Siskiyou National Forest boundary downstream to the Lobster Creek Bridge, is under the administration of the Forest Service (Figure 2-13). Both BLM and USFS prepared master plans in 1969 for the river segments administered by each, and a joint plan was prepared in 1972.

The Wild and Scenic Rivers Act provides for the management of a designated river or river segments as wild, scenic, or recreational. Within the BLM section of the Rogue River, two of the three management classifications are utilized. A 27-mile long recreational river area, extending from the mouth of the Applegate River to the Grave Creek Bridge, is managed to provide or restore a wide range of outdoor recreation opportunities on the river. The remaining 20-mile section is classified as a wild river area. It is managed to preserve the river and its immediate environment in a natural, wild, and primitive condition essentially unaltered by the effects of man as well as to provide river-oriented recreation opportunities within a primitive setting.

Approximately 11,087 acres of the Rogue Wild River corridor (the area within one-quarter mile on each side of the river) within the SYU have been withdrawn from timber harvest to protect the scenic and recreational values. Management objectives contained in the 1972 master plan also provide for protection of scenery within view of the river or adjacent Rogue River Trail even if the seen area is outside the withdrawal area (37 FR 131: 13415, 1972).

Visitation to the Rogue River has increased substantially since it was included in the National Wild and Scenic Rivers System. The popularity of the river, which is also included in the Oregon Scenic Waterway System,

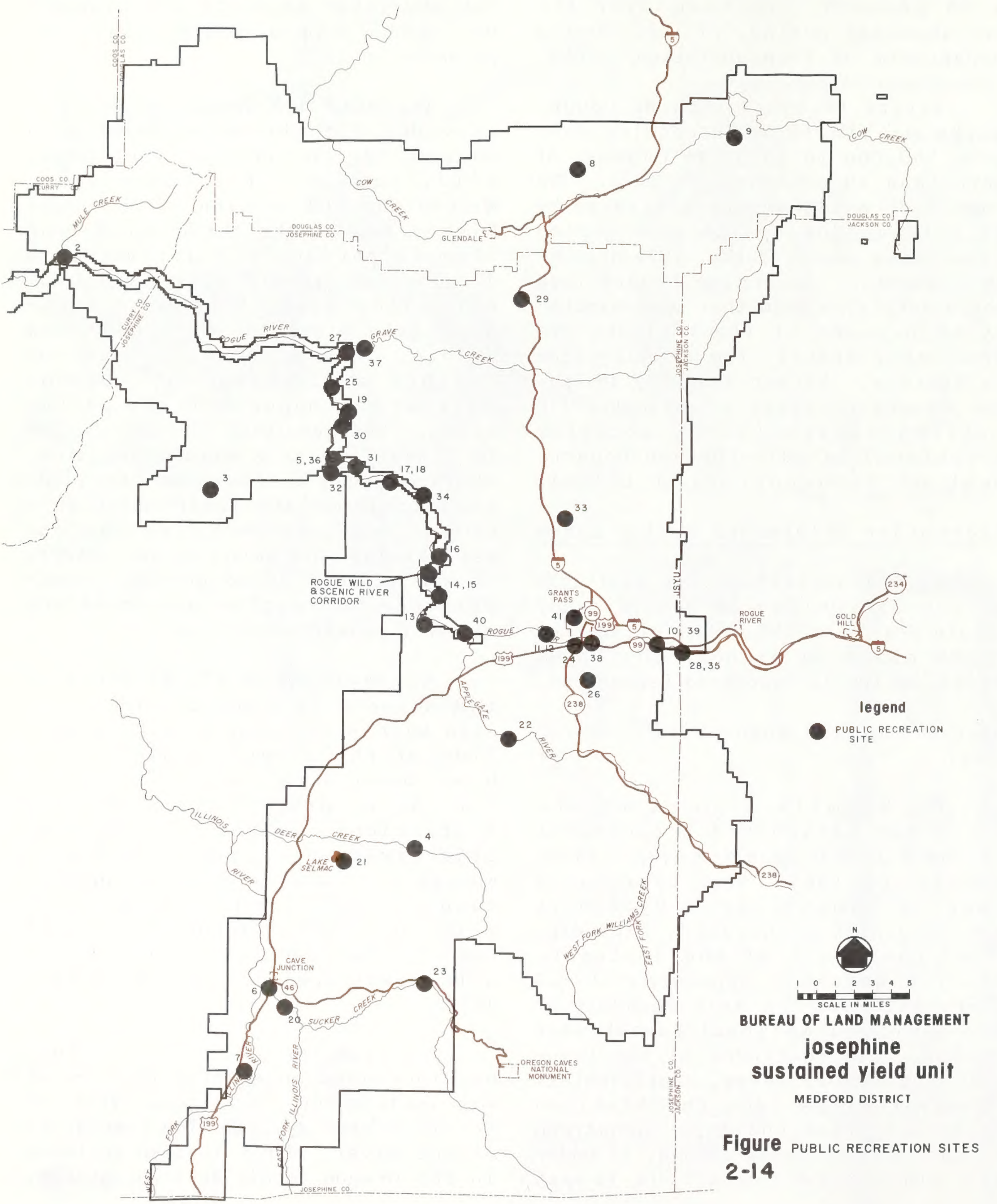


Figure 2-14 PUBLIC RECREATION SITES

Recreation Sites
(Legend for Figure 2-14)

Bureau of Land Management

1. Rogue Wild Scenic River
2. Tucker Flat Campground
3. Shady Branch Campground
4. Deer Creek Campground

State of Oregon

5. Hellgate Overlook
6. Illinois River Forks State Park (R&PP Lease)
7. Rough and Ready Wayside (R&PP Patent) 1/

Douglas County

8. Windy Creek
9. Whitehorse Park

Josephine County

10. Chinook Park
11. Schroeder Park
12. Lathrop Access
13. Matson
14. Upper Ferry
15. Griffin Park (R&PP Patent) 1/
16. Robertson Bridge Access
17. Hellgate (R&PP Lease)
18. Indian Mary
19. Almeda Bar
20. Illinois Valley
21. Lake Selmac (R&PP Lease)
22. Fish Hatchery
23. Sucker Creek
24. Irrigation Park
25. Argo Recreation Area (R&PP Lease)
26. Cathedral Hills (R&PP Lease)
27. Graves Creek Access (R&PP Lease)
28. Pierce Riffle
29. Wolf Creek
30. Rand Recreation Area (R&PP Lease)
31. Ennis Riffle (R&PP Patent) 1/
32. Carpenter Island (R&PP Lease)
33. Josephine Co. Sportsman Park
34. Hog Creek Landing
35. Foothill Access
36. Galice Launch Site
37. Reuban Recreation Area (R&PP Lease)
38. Riverside Park
39. Pearce Park
40. White Horse Park

Grants Pass

41. Highland Recreation Area (R&PP Lease)

1/ Title passed to local government under provision of Recreation and Public Purposes Act. Each title document contains a clause for reversion of lands to the United States if not used in conformity with the provisions of the grant.

resulted in the need to ration use to protect the values for which the river was included in the National System.

In 1976, 1,480 parties (more than 12,000 persons) visited the wild river during the summer and fall. The number of people boating on the wild Rogue during the summer season has doubled from 1973 to 1976 (Table 2-20). The number of day users at the Grave Creek checkpoint during the summer season has grown from 1,916 visitors in 1973 to 4,639 in 1976, an increase of 142 percent. However, use at developed sites along the recreational portion of the Rogue has increased very little since 1974. While BLM does not manage any campground or day use recreation areas along this portion of the river, use data from 12 Josephine County parks located along this river segment show an increase from 258,500 visitors in 1974 to 275,500 visitors in 1975, an increase of about 5 percent. These figures do not include the fishing and picnicking which occurs along non-developed public access areas. Based on average daily traffic (ADT) counts on county roads which provide access to the recreation river, over 4,000 visitor days of sightseeing can be attributed to public lands during 1974.

Sightseeing

General sightseeing results when persons drive through public lands, whether they are specifically visiting public lands or merely passing through. Land administered by BLM provides a backdrop of forested hills where the viewer can observe different forest types and land

Table 2-20

Rogue Wild River Boating Use
Summer Season (Memorial Day-Labor Day)

	1973	1974	1975	1976	Percent Increase (1973-1976)
Commercial Boating					
Parties	255	246	285	311	
People	3,340	3,704	4,000	4,885	48%
Non-Commercial Boating					
Parties	207	277	415	632	
People	1,002	1,736	2,520	3,854	285%
Total Boating					
Parties	462	523	700	943	
People	4,342	4,440	6,520	8,739	101%

Source: Bureau Planning Documents: Rogue Wild River Recreational Use Census.

patterns resulting from timber management and other activities. Often termed driving for pleasure, general sightseeing is primarily associated with travel along established roadways. A primary indicator of general sightseeing participation is road statistics. Based on ADT counts for 1974, over 200,000 visitor days of sightseeing can be attributed to public lands outside the Rogue River corridor.

In addition to general sightseeing, persons utilize public lands for specific sightseeing goals or sightsee in connection with other activities, particularly hiking or stream floating. Various resources on public lands furnish a basis for sightseeing related activities. Figure 2-15 shows the location of known areas which provide opportunities for botanical, geological, and wildlife sightseeing.

In the southern portion of the Josephine SYU, numerous caves provide information about geological occurrences and may contain interesting minerals or unusual plant and animal life.

Botanical sightseeing encompasses the viewing of common forest types as well as plants with unusual botanical value. A number of unusual and possibly rare and endangered plants inhabit the SYU. Threatened and endangered plant species are discussed in the vegetation section. Places which have unusual botanical value include the Rogue Wild River Area, Hobson Horn, Cedar Mountain, Eight-Dollar Mountain, Rough and Ready State Wayside, Brewer Spruce Research Natural Area, Myrtlewood Grove, and Woodcock Bog. Numerous other sites have been inventoried by the Nature Conservancy; however many of these are not a matter of public record (Nature Conservancy 1977). Serpentine areas occur throughout the SYU and are of interesting botanical value. Areas of serpentine soils are shown in Figure 2-5. The unusual plant communities and vegetation found in these serpentine areas are discussed in Section 2.1.2.1. Specific areas set aside for their botanical value are discussed further in Section 2.1.4.

A variety of birds, small animals, deer and bear may occasionally be seen from roads or rivers. An area within the Rogue Wild River Corridor near the Rogue River Ranch has been recommended by the Oregon Fish and Game Commission for a wildlife viewing area. Wildlife that can be seen in the vicinity of the ranch include black-tailed deer, black bear, river otter, silver gray squirrel, mountain quail, osprey, great blue herons, bald and golden eagle and the common merganser. These species are visible all along the designated wild river. The Nature Conservancy (1977) has inventoried several heron rookeries, two eagle nests and an osprey nest within or adjacent to public lands.

There are several sites of historical interest, three of which are designated in the National Register of Historic Places. A discussion of these sites along with a map and tables can be found in Section 2.1.3.2.

Hunting

Opportunities exist for hunting big game (deer, elk and bear), upland game birds, small game, and to a limited extent, waterfowl. With one

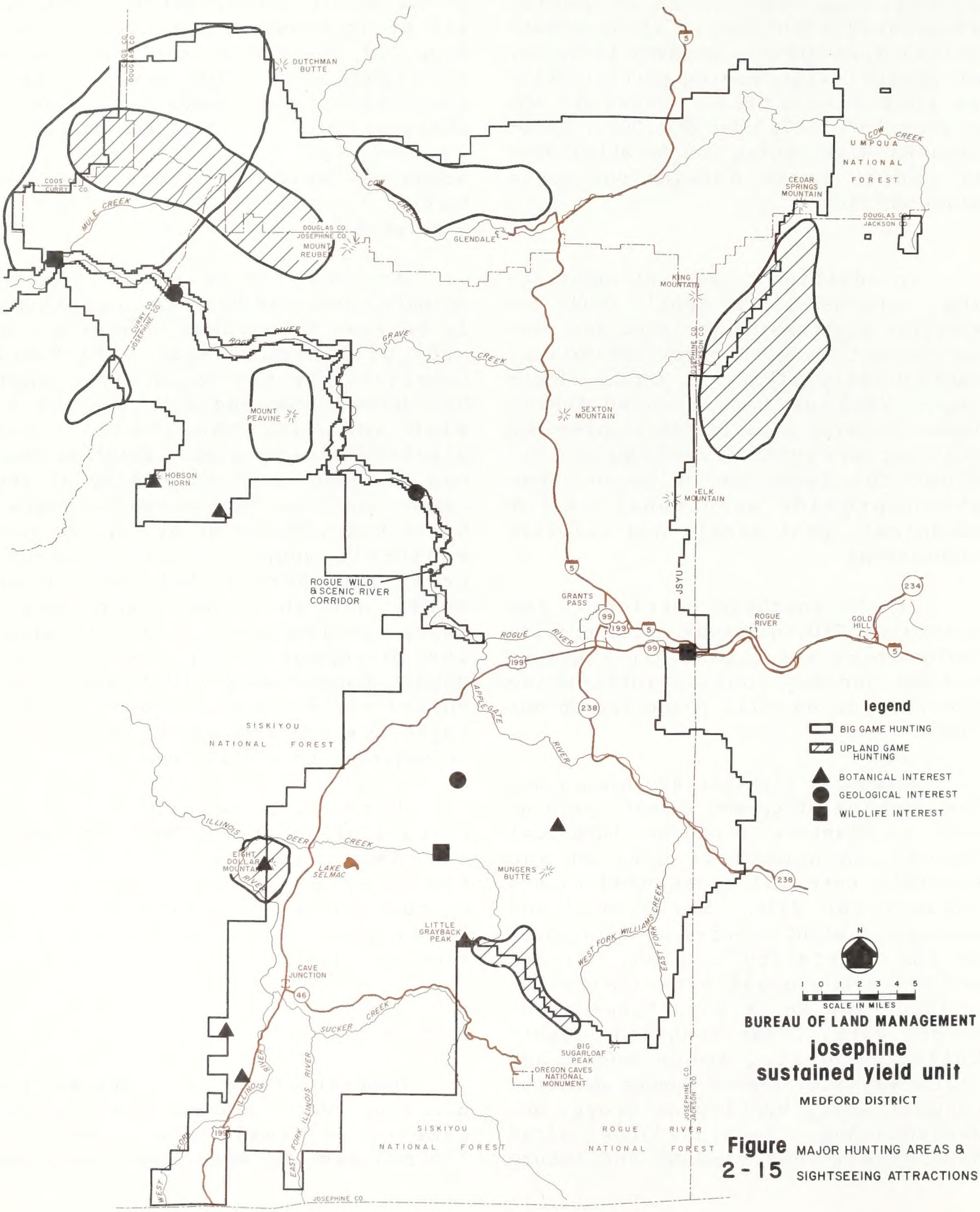


Figure 2-15 MAJOR HUNTING AREAS & SIGHTSEEING ATTRACTIONS

exception, all public lands in the SYU are open to hunting. The area 1 mile on either side of the Rogue River beginning at Grave Creek and extending beyond the Josephine SYU to Lobster Creek is closed to bear hunting. Figure 2-15 shows locations of major hunting areas.

Hunting for black-tailed deer is the most popular hunting activity in the SYU in terms of hunter days on public lands. This is followed by hunting upland game birds, silver gray squirrel, Roosevelt elk, waterfowl, and black bear (see Table 2-21).

The wildlife hunting resource produced on the public lands is significant and accounts for 18 percent of the hunter days expended in the four State-administered Big Game Management Units (BGMU) which cover the SYU. Total hunter days may reflect some overlap because several hunting seasons run concurrently. Harvest figures computed in Table 2-21 reflect a 7 percent harvest of the estimated deer population. This harvest is far below the resource production capability. The trend in the number of deer harvested and percent of hunter success is shown in Table 2-22. This low hunter success reflects a trend of a declining deer population which has continued since the severe winter of 1968-69. A discussion of this trend appears in Section 2.1.2.2.

Table 2-21

Annual Harvest and Hunter Days Attributable to Public Lands, JSYU (yearly average, 1970-1975)

	Number Harvested on Public Lands	Hunter Days on Public Lands	Hunter Days/ 1,000 acres Public Land
Black Tailed Deer 1/	633	14,480	34.013
Roosevelt Elk 1/	29	1,080	2.537
Black Bear 1/	26	254	.597
Silver Gray Squirrel 1/	896	1,528	3.589
Upland Game Birds 2/	6,229	5,436	12.769
Waterfowl 2/	202	271	.637
TOTAL		23,050	

1/ Based on percent of public lands within BGMU
2/ Based on percent of public lands within Josephine County

Source: Josephine Planning Area Analysis

Table 2-22

Deer Harvest: 1970-1975

Oregon Big Game Mgmt. Unit (BGMU)	Year	Number of Deer Harvested	Hunter Success Percent	Per Cent of Public Lands in BGMU	Est. Harvest[1/] on Public Lands
Powers	1970	930	42	24	223
	1971	1,040	57	24	250
	1972	860	34	24	206
	1973	790	27	24	190
	1974	720	20	24	173
	1975	700	23	24	168
Evans Creek	1970	750	37	15	113
	1971	770	46	15	116
	1972	930	41	15	140
	1973	1,450	30	15	218
	1974	1,440	26	15	216
	1975	430	11	15	65
Chetco	1970	1,050	45	7.8	82
	1971	730	31	7.8	57
	1972	1,360	49	7.8	106
	1973	1,670	35	7.8	130
	1974	780	21	7.8	61
	1975	670	20	7.8	52
Applegate	1970	1,490	36	13	194
	1971	1,320	35	13	172
	1972	1,190	29	13	155
	1973	2,570	26	13	334
	1974	2,230	23	13	290
	1975	710	10	13	92

1/ Based on the assumption that deer habitat within each BGMU is homogeneous. Number of deer harvested in each BGMU is then multiplied by percent public lands within BGMU to give estimated harvest on public lands.

Source: Department of Fish and Wildlife Annual Reports 1970-75.

Virtually all of the public lands within the SYU provide habitat for some species of wildlife. It is estimated that at least 60 percent of the hunting effort that occurs on public lands is due in part to suitability of habitat and limitations on access to private land.

Fishing

Most of the fishing in the SYU is for salmon and trout. The Rogue is internationally known for its outstanding salmon and steelhead trout fisheries. Salmon fishing also occurs below Pomeroy Dam on the Illinois River. The Applegate River, a major tributary to the Rogue, sustains limited fishing but could become an important steelhead fishery with flow augmentations from the proposed Applegate Dam. There are no public lands fronting on this river within JSYU. The Oregon Department of Fish and Wildlife has planted segments of the Applegate River, Rogue River, Sucker Creek and Cow Creek with legal size rainbow trout which constitute a put and take fishery. In 1974-75, there were 32,705 angler days attributable to cold-water fishing on public lands within the JSYU. Table 2-23 further shows that the overall annual contribution of the combined fishery resources for streams on public lands within the JSYU is an estimated 46,324 angler days and 38,422 fish caught in various freshwater and ocean sport fisheries. An additional 33,600 fall chinook and 269 coho attributable to habitat production within the JSYU are landed by the commercial ocean troll fishery.

While fishing for anadromous species is limited to main stems of the three drainages mentioned, resident trout fishing occurs or could occur on many side streams. None of these streams offers outstanding opportunities. Some lack trout in large sizes or quantities, some are inaccessible either physically or legally. Use pressures on all of them are light to moderate, in relation to the opportunities available on the major streams.

A major limitation on fishing opportunities in valley streams is the diversion of water for irrigation purposes. With the annual onset of crop irrigation, some streambeds are nearly dried. Thus only the upper reaches of many side streams support a usable resource. In a dry year, like 1976-77, this situation is exacerbated.

Miscellaneous Activities

There are few opportunities for winter activities due to topography and weather conditions. Some snow play and snowmobiling does occur, mostly alongside logging roads. Participants in this minor activity are mostly from the local area.

The primary water sport is floatboating on the Rogue Wild River. Twenty miles of the Rogue, from Grave Creek to Marial, are of outstanding quality for this activity. Floatboating use on the recreational portion is comparatively low, though both private and commercial parties use it. Power boating, including commercial jet boat tours, occurs on the recreational segment. Sailboating and swimming take place at the Josephine County facility at Lake Selmac. Unsupervised swimming occurs at Illinois River Forks State Park and along other streams and creeks throughout the SYU. No data are available on the use of public lands

Table 2-23

Angler Days and Game Fish Sport Catch Within the Josephine Planning Area and Sport Fishery Outside the Planning Area Attributable to Habitat Production Within the Planning Area
1974-1975

Species	Angler Days in the Unit: Angler Days	% Habitat on Public Land	Angler Days on Public Land	Catch Within the Unit: Catch	% Public Land	Annual Catch Attributable to Habitat Production Within JSYU
Summer steelhead	38,800	36	13,968	9.700	36	3,492
Winter steelhead	31,000	27	8,370	7,750	27	2,093
Spring chinook	2,805	46	1,290	850	46	391
Fall chinook	2,673	28	748	810	28	227
Coho salmon	33	28	9	10	28	3
Resident trout	26,000	32	8,320	6,500	32	20,800
		Subtotal	32,705		Subtotal	27,006

II. Angler Days in Lower Rogue (off site) — Catch in Lower Rogue

Species	Angler Days	% Habitat on Public Land	Angler Days on Public Land	Catch	% Public Land	Annual Catch As Above
Fall chinook	780	28	218	520	28	146
Summer steelhead	10,874	36	3,915	4,565	36	1,643
Winter steelhead	9,912	27	2,676	4,130	27	1,115
		Subtotal	6,809		Subtotal	2,904

III. Ocean Sport Fishery Angler Days — Ocean Sport Fishery Catch

Species	Angler Days	% Habitat on Public Land	Angler Days on Public Land	Catch	% Public Land	Annual Catch As Above
Fall chinook	24,000	28	6,720	30,000	28	8,400
Coho salmon	320	28	90	400	28	112
		Subtotal	6,810		Subtotal	8,512

IV. Commercial Ocean Troll Fishery Catch

Species				Catch	% Public Land	Annual Catch As Above
Fall chinook	—	—	—	120,000	28	33,600
Coho Salmon	—	—	—	960	28	269
					Subtotal	33,869

TOTAL ANGLER DAYS (combined Sport Fishery Resources)	46,324	TOTAL CATCH (combined fishery resources) attributable to habitat production within JSYU	72,291

Source: BLM Medford District Josephine Planning Area Analysis 1977.

for water sports other than float-boating.

Opportunities for recreational gold panning may be found at several streams throughout the area. Collecting is known to take place at Grave, Mule, Galice and Coyote Creeks. Collection of agate, Oregon jade (green garnet) and Josephenite is reported to occur within the sustained yield unit. Use estimates are not available.

Operating motorcycles and four-wheel drive vehicles on logging roads, jeep trails and skid trails is very popular and accounts for much of the total recreation experience on public lands in the SYU. While there are no trails specifically designated for ORV use, certain areas are popular for hill climbing and general play. These are shown in Figure 2-16.

Prior to construction of the present road system, many fire access trails existed in the JSYU, some of them built in the 1930s by the Civilian Conservation Corps. While the Rogue River Trail is the only hiking trail designated and maintained by BLM within the Josephine SYU, remnants of the old trails can still be identified where undisturbed by road construction or logging. These trails, especially in roadless areas such as those within the Rogue River Canyon, sustain an unknown amount of hiking. Most recorded hiking takes place on the Rogue River Trail, which parallels the Rogue Wild River. Twenty-four miles of the 68-mile trail are maintained by BLM; the remainder is under the jurisdiction of the U.S. Forest Service. The number of visitors using the trail on public lands increased from 809 in 1973 to 1,046 in 1976, or about 31 percent.

While picnicking occurs throughout the SYU, no designated picnic areas are managed by BLM. Various activities which have recreational value to some persons are found throughout the SYU. These include collecting firewood, cutting Christmas trees, trapping fur-bearing animals and predator hunting.

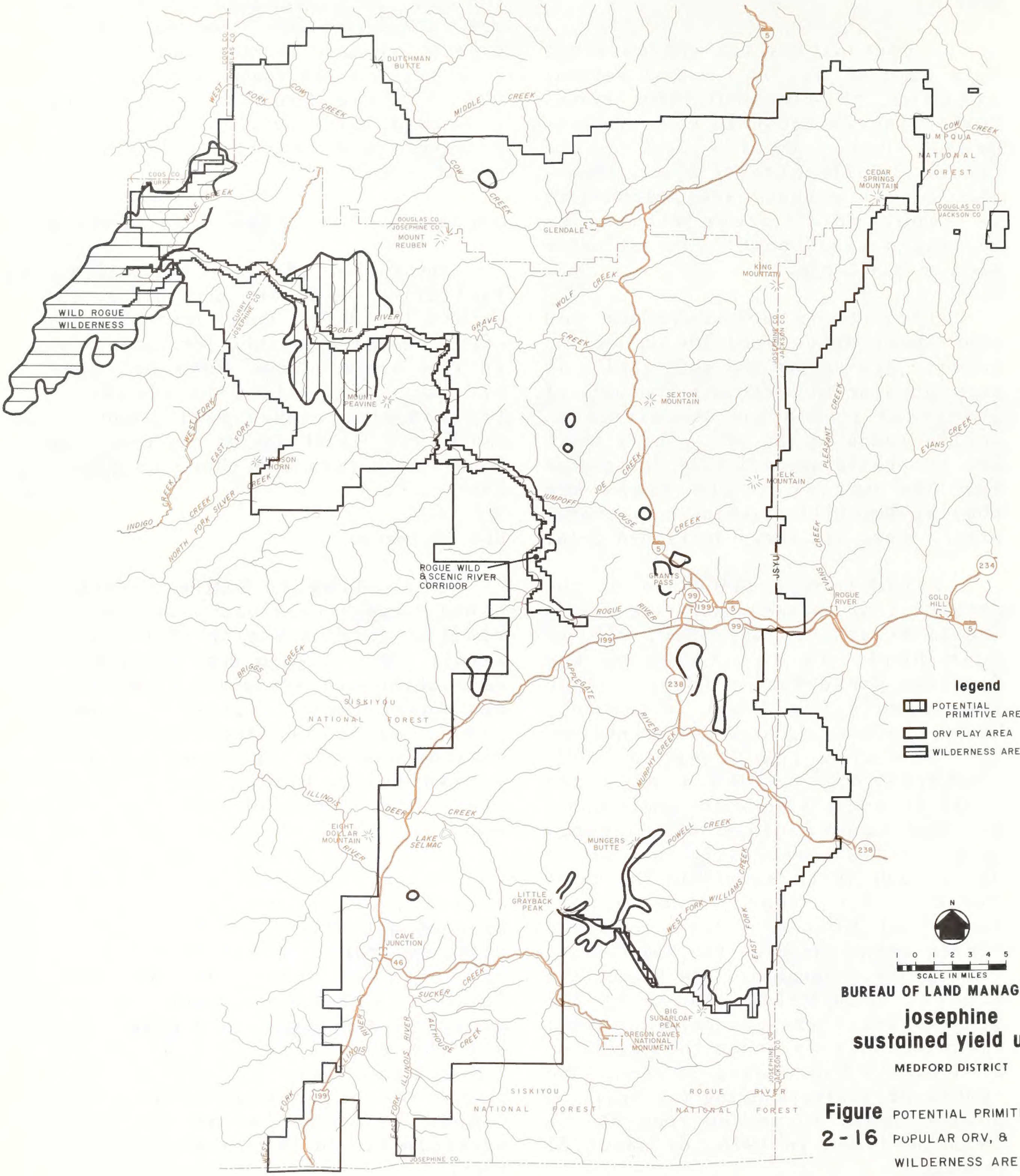
Recreation Management Facilities

Only limited visitor management facilities have been provided by BLM within the JSYU. Until recently, six sites were maintained for public use in the area. Two, however, were closed due to sanitary problems, limited maintenance funds, and low use rates. Locations of the remaining four facilities are shown on Figure 2-14.

Use Estimates

According to BLM estimates, public lands received over 334,670 visitor days of use in 1976 (Table 2-24). This figure does not include recreation use of public lands which are under lease or patent to other public agencies. Previously cited visitor use data for other recreation jurisdictions within Josephine SYU give an indication of this additional use.

Table 2-25 shows the percent of activity occasions accounted for by each activity type in comparison with the total of all recreational activity generated by Josephine County residents. Camping, for example, represents 4.2 percent of all the recreational activity in Josephine County. Table 2-26 shows the percentage of Josephine County's population in 1975 that participated in 19 recreation activities.



BUREAU OF LAND MANAGEMENT
josephine sustained yield unit
MEDFORD DISTRICT

Figure 2-16 POTENTIAL PRIMITIVE, POPULAR ORV, & WILDERNESS AREAS

Table 2-24

Estimated Recreation Use on Public Lands, 1976

Activity	Visitor Days (12 hour visitor day)
Rogue Wild River	
Boating 1/	
Overnight 2/	54,540
Day Use	10
Hiking 1/	
Overnight 2/	6,680
Day Use	440
Rogue Recreation River 3/	
Sightseeing	4,100 5/
Motorcycle/ORV/4-wheel	16,300
Camping (non-Rogue River)	9,800 6/
Fishing	12,100
Hunting	4,900
General Sightseeing	217,300 5/
Miscellaneous 4/	8,500
	334,670

1/ Includes 967 visits (485 visitor days) of fishing activity
2/ Overnights at private lodges are included
3/ Use estimates for dispersed recreation at non-county sites not available
4/ Includes snow, play, collecting, sightseeing other than general sightseeing (historical, botanical, wildlife, geological), incidental hiking, camping, and picnicking in underdeveloped areas. Estimate is based on professional judgment
5/ 1974 latest data available
6/ FY 74 latest data available

Source: BLM, Medford District

Table 2-25

Distribution of Recreational Activity for Josephine County in 1975

Activity	Distribution
Camping	4.2
Picnicking	8.6
Non-pool swimming	2.1
Fishing	8.9
Motorboating	1.5
Floatboating	1.3
Water skiing	0.6
Pleasure walking	22.8
Hiking	2.6
Hunting	1.8
Outdoor games	11.9
Bicycling	4.7
Horseback	1.2
Down-hill ski	0
Cross-country ski	0
Snow play	0
ORV	7.0

Source: Oregon Department of Transportation 1976a.

Table 2-26

Percent of Josephine County Population Participating in Recreation Activities Compared to Statewide Percentages (1975)

Activity	Josephine County	Statewide	Activity	Josephine County	Statewide
Camping	51.67	54.13	Hiking	29.36	35.16
Picnicking	70.37	73.04	Hunting	19.57	18.83
Nonpool Swimming	34.92	34.40	Outdoor Games and Sports	34.65	32.66
Sightseeing and Driving for Pleasure	36.38	42.92	Bicycling	24.60	35.36
Fishing	41.17	47.60	Horseback Riding	6.61	10.57
Motor Boating	16.47	27.27	Downhill Skiing	4.23	7.53
Float Boating	7.67	11.26	Cross-country Skiing	2.11	2.98
Water Skiing	12.94	14.47	Snow Activities	31.76	25.42
Pleasure Walking	35.18	45.71	Off Road Vehicle Activity	11.90	14.54
			Other	2.11	3.51

Data for pool swimming, golfing, and tennis were not included.

Source: Oregon Department of Transportation 1976a.

Demand Projections

By 1990, the population of Josephine County is expected to increase by 46 percent of the 1975 population (Portland State University, Center for Population Research 1976). This figure can be used to project increased recreational use as a result of local demand. The Oregon State Highway Division estimates that, by 1990, statewide recreation demand will increase by 103 percent over 1970 estimates (Oregon Department of Transportation 1972). These estimates are based on both in-state and out-of-state use and other concomitant trends. Table 2-27 presents estimated current use and low and high estimates of projected 1990 demand.

Potential Recreation Management Facilities within Josephine SYU

At least 19 sites have been identified as having recreation values for future development. Four sites have potential for facility development such as campgrounds. The remainder have potential for limited development such as fishing access, trails, or picnic areas. Figure 2-17 shows the approximate location of these sites. It is not known whether any of these sites will be needed in order to manage future recreation use on public lands.

The U.S. Forest Service has determined that the Illinois River from the Siskiyou National Forest boundary at Eight Dollar Mountain upstream to the California State line, qualifies for recreational status under the criteria established for wild and scenic rivers but has recommended that this portion of the river not be included in the National System. BLM administers 6.5 percent (1,780 acres) of the land within one-quarter mile of this river segment as part of the Josephine SYU (U.S. Forest Service 1977a).

2.1.3.2 Cultural Resources

General

The term "cultural resources" as used in this statement primarily refers to remains of human activity. However, since fossils of historic, scientific, and unusual interest are protected by the Antiquities Act of 1906, this category is included in this section. Structures, artifacts, works of art, irrigation systems, architecture, historical documents, and locations where historical events took place are only suggestive of the broad range of objects and sites that are considered to be cultural resources.

Federal agencies have been charged with responsibility for the cultural resources on lands under their jurisdiction. Through a group of laws beginning with the Antiquities Act, BLM has been authorized to identify, protect and enhance such resources on public lands. The following procedures were used to identify the cultural resources within the Josephine SYU.

1. The State Historic Preservation Office was asked to identify sites that are on or eligible for nomination to the National Register.

2. The pertinent literature, both published and unpublished, was consulted. Works used are listed in Appendix N.

3. Knowledgeable persons from within and outside the area

Table 2-27

Estimated and Projected Visits to Public Lands

	Visits/Year	1990 Visits/Year Low	1990 Visits/Year High
Hunting	23,050	33,653	46,792
Fishing	28,367	41,416	57,585
Winter Activities	262	383	532
Water Activities	30,227	44,131	61,361
Collecting	794	1,159	1,162
Sightseeing			
Historical	1,872	2,733	3,800
Geological	410	599	832
Zoological	1,374	2,006	2,789
Scenic	26,361	38,487	53,513
Botanical	1,428	2,085	2,899
Off-Road Vehicle Use	41,888	61,156	85,033
Primitive Values	1,004	1,466	2,038
Camping	4,650	6,789	9,440
Picnicking	50	73	102
Total	161,737	236,136	328,807

Source: Medford District, Bureau Planning Documents, 1977.

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Source: Medford District, Bureau Planning Documents, 1977.

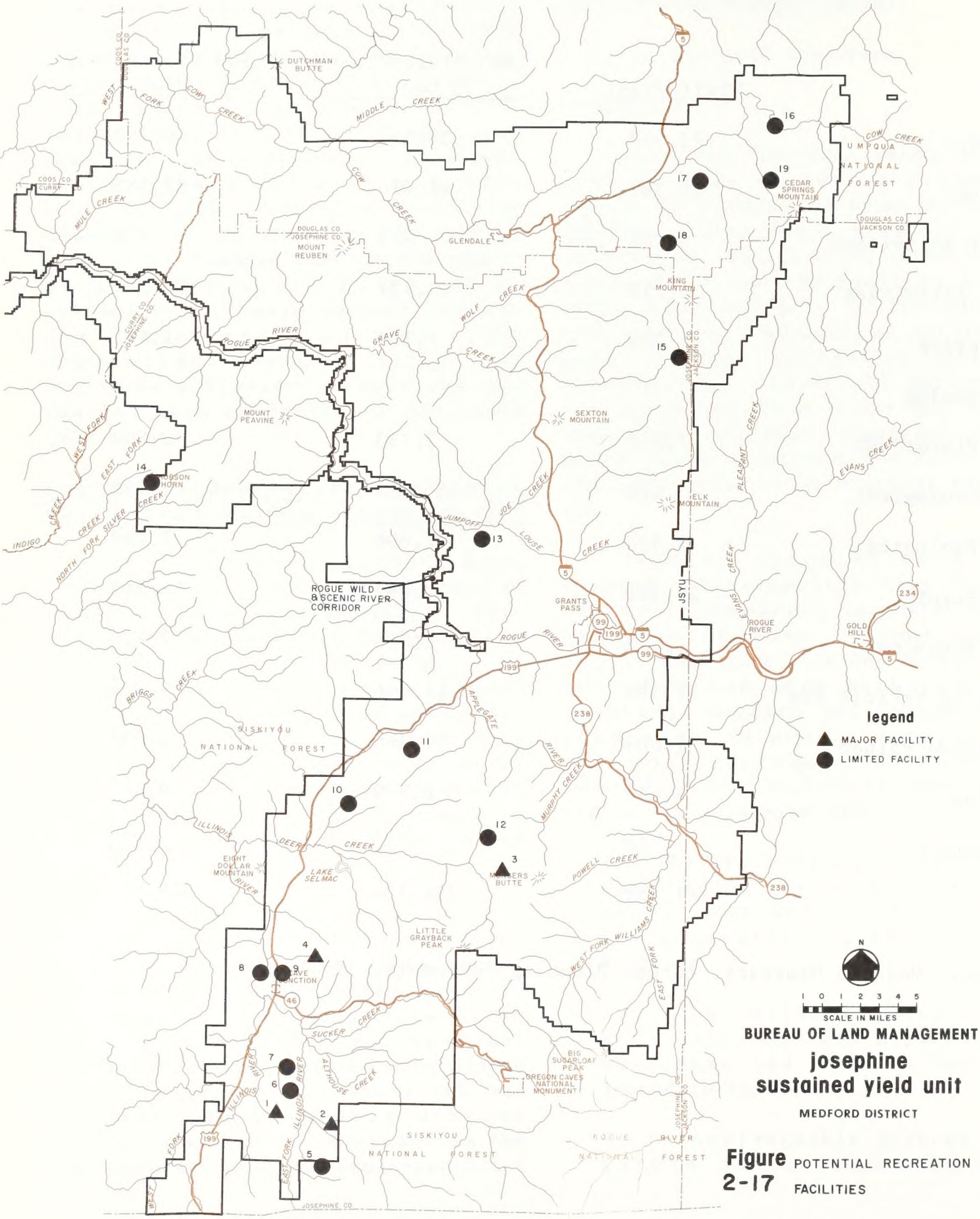

Figure 2-17 POTENTIAL RECREATION FACILITIES

were asked for information. They included amateur archeologists, elderly residents, the Josephine County Historical Society and the Jacksonville Museum.

4. The Medford District Cultural Resources Specialist provided the information that he has acquired through project clearance and general reconnaissance of the area.

5. The most recent listing of the National Register of Historic Places was consulted.

The topography and dense forest covering most of the area make an on-the-ground sample survey of cultural resources almost totally ineffective (Aikens 1976; Lovis 1976). Due to the size of the existing cultural resource data base in western Oregon and lack of success of general inventory surveying, it is not possible to predict the number and/or locations of cultural resources likely to be present in the JSYU. Within this region, where little is known of archeology, any and all sites are important. Those that are known are treated as significant.

The criteria used to assess the eligibility of identified cultural resources for inclusion in the National Register of Historic Places are described in 36 CFR 800.10. BLM employs a Cultural Resources Evaluation System (CRES) to stratify the relative value of an archeological or historical site. Significance ratings from S-1 (National Register nomination quality) to S-4 (no physical remains) are assigned to each identified cultural resource. A CRES rating is not static. Periodic review, in light of new information, assures continuation of adequate evaluation.

<u>Before Contact with Whites</u>

It is a well-documented fact that at least some areas in Oregon have been occupied by aboriginal populations for at least 12,000 years. There is good reason to hypothesize that portions of the Josephine area have been utilized over the same time span. However, largely because of topography and dense ground cover, the area has not attracted the attention of the archeological research community. Only eight publications are listed in Johnson and Cole's "Bibliographic Guide to the Archeology of Oregon" - 1972. Three of these are reports of surveys done prior to the construction of reservoirs, and three are reports of salvage operations prior to reservoir construction.

Cressman's "Final Report on the Gold Hill Burial Site" and "Aboriginal Burials in Southwestern Oregon" are the only research-directed studies available. These were done in 1933 and have very limited application beyond the specific sites. As a result of the lack of research interest, only eight prehistoric sites have been recorded:

Hellgate Site (T.35S R.7W)
MNH 35 do-15 (T.31S R.9W)
Jackass Prairie (T.32S R.8W)
35-AR-11-42 (T.32S R.9W)
35-AR-11-43 (T.32S R.9W)
35-AR-11-44 (T.31S R.9W)
McCaleb Ranch (T.37 R.9W)
35-AR-11-45 (T.31S R.9W)

While the prehistory of the area has been largely ignored, there has been some work by ethnologists on the

life-styles of the inhabitants during the time just prior to white contact. Essentially the entire area within the Josephine SYU was occupied by Takelma (or Dagelma) Indians. The Takelma language is not related to the language of any group in the surrounding area. Estimates of total population do not exceed 500, divided into the Lowland and the Upland groups. Both groups were semi-sedentary and spent a considerable part of each year in small villages of perhaps 50 to 150 people. The Takelma were hunters and gatherers, although the bulk of the caloric intake came from vegetable rather than animal foods. Considerable use was made of salmon, freshwater mussels, and crayfish. Extensive forest burning was practiced with the result that the vegetation in the valley area at the time of white contact was not what it would have been without human occupation. Much use was made of basketry. Crudely fashioned, fired pots and small figurines were made. Pithouses were built of split pine boards with gable roofs. The principal weapon was the sinew-backed yew wood bow.

The Takelma in general and the Upland Takelma in particular had a reputation for ferocity, making frequent raids upon other Indian tribes for slaves. They also resisted white intrusion. So hostile and troublesome were the native peoples that French fur trappers referred to them as "rogues". Thus the Rogue River and the Rogue River Indians became known to white newcomers.

While there may be some individuals who can claim biological descent from the Takelma, the group has long since vanished as a linguistic and cultural entity. Preliminary linguistic and ethnographic analyses tend to show that the Takelma had occupied the area for several hundred years.

CRES rating criteria for archeological resources include depth of site architectural features, artistic features, size of site, age of antiquity, length of occupation, uniqueness of the site, representativeness, and condition. Application of CRES to the few pre-contact sites identified in the statement area results in data displayed in Table 2-28.

Post White Contact

The inland areas of southwestern Oregon were first penetrated by Europeans in the mid-1820s when the Hudson Bay Company began sending fur brigades from Fort Vancouver southward to trap the valleys. The Americans, most notably Ewing Young, began to enter the area in the 1830s. Young went to San Francisco where he purchased 750 head of cattle which he drove north more or less along the present route of Interstate 5 to the Willamette settlements in 1837. Thus by the late 1840s a fairly well-traveled route had been established between the rapidly growing settlements of the Willamette Valley and the San Francisco area. The traffic swelled in 1846 when the Applegate trail was established across the Black Rock Desert of Nevada and the mountains between Lake Klamath and the Rogue River Valley, linking up with the already established north-south route. Unfortunately, there are few if any identifiable remains from this era.

After the initial gold discoveries in California in 1848, new strikes were made at Galice and Jacksonville in 1851 and on the

Table 2-28

Archeological Sites Within the Josephine SYU

Archeological Sites	Attributes/Condition	Significance/ Rating	Jurisdiction
McCaleb Ranch	Indian burials and artifacts Private owner allows no investigation	S-2	Private
Hellgate Site (recorded)	Surface scatter of lithic debris. Vandalized	S-3	BLM
MNH 35 DO-15	Surface scatter of obsidian flakes	S-3	BLM
Jackass Prairie	Area of springs and young timber: may have been on Indian hunting site	S-3	BLM
35-AR-11-42	Lithic scatter - very recently identified	S-2	BLM
35-AR-11-43	" " " " "	S-2	BLM
35-AR-11-44	" " " " "	S-2	BLM
35-AR-11-45	" " " " "	S-2	BLM

Note: CRES ratings S-1 to S-4 for archeological resources are defined as follows:

S-1. National Register Significance. In general, S-1 properties show a clear potential for yielding, or have yielded, highly significant scientific/educational information and are clearly important in terms of national, State, or local prehistory.

S-2. Mid-Significance. S-2 properties are usually not particularly unique, representative, nor do they have important associations. The condition of the property usually is only fair. These kinds of properties are often large but do not have great antiquity and only limited depth potential.

S-3. Low Significance. The S-3 rating is assigned if the main worth of the property is its potential for contributing data in regards to solving larger problems, such as reconstruction of paleo-environments and areal human usage patterns. These kinds of properties usually show little if any depth, no or very few features, may have great antiquity but be very small, or may be very large but show no great antiquity or concentration of materials.

S-4. Data Property. The S-4 rating is assigned only to properties that have been totally destroyed.

Source: BLM, Medford District

Illinois River in 1852. Hordes of fortune seekers soon established thriving settlements at Jacksonville, Waldo, Allentown, and Browntown. The miners were followed by farmers who took up arable lands along the Rogue and other interior valleys. Lumbering, for local use only, also began during this period. Inevitably this population growth was to lead to hostilities with the aboriginal inhabitants. There were numerous outbreaks of violence and hostility on both sides which culminated in the defeat of the Indians in the spring and early summer of 1856. In June of 1856 all of the Indians in the area were removed to the Siletz reservation in northwestern Oregon.

Identified physical remains of this period are few. The early mining centers of Waldo, Allentown, and Browntown are gone, and there is little to mark the battlefields and encampments of the Indian wars.

By 1860 nearly all of the good lands in Oregon and elsewhere on the Pacific coast had been settled, the easier gold deposits had been worked, the Indians pacified or removed. The period from 1860 to 1884 has been subject to little historical research or interpretation, it appears that the entire area settled into a relatively prosperous broad spectrum agriculture. While mining declined during the 1860s, gold was one of the

Placer mining in the late 1800s left many boulders and debris in the gulches and creek channels of Southwestern Oregon (Galice Creek)

major export items as an exchange for goods not produced locally. During the 1870s and 1880s, less accessible gold deposits were worked and Chinese immigrants reworked some of the old areas. Old Channel Hydraulic Mine, located on a "high level" gravel terrace paralleling Galice Creek and the Rogue, was at its peak during this period. In the mid-1880s hard rock or quartz mining activity increased.

Major routes of travel continued to be the old north-south route and the route to the coast and Crescent City which followed the present route of U.S. 199. Very few remains of the period have been documented.

Construction of the Oregon and California Railroad (which became the Southern Pacific in 1888) from Portland to the San Francisco Bay area began in 1868. Trains were running as far south as Eugene by the following year. Thereafter, financial and technical difficulties mounted and the line did not reach the Rogue Valley until 1884. The major effect of the railroad, when it was finally completed, was to tie the local economy to the national. The advent of rail service initiated shifts in population, reflected in the movement of the county seat from Kerby to Grants Pass in 1886. Specialty agriculture developed in order to compete in markets outside the valley. Mining activity continued strong. By 1905 the Almeda mine on the north bank of the Rogue was being developed and a smelter was built in 1908. The ore deposit on which this mine was located was especially valuable for copper, but also contained silver, lead and zinc. This mine had more than a mile of underground tunnels, one of which ran under the Rogue (Winchell 1914).

A lack of rail lines into the western portions of the county hampered the growth of agriculture and the timber industry. In 1911 construction was begun on the California and Oregon Coast Railroad from Grants Pass to the coast. However the railroad was only completed to a point about 10 miles southwest of the city. Other than mining areas, there are few inventoried sites from this period.

The present era has brought extensive changes to the area both physically and socially. Logging on a commercial scale is a recent arrival and the elements of pre-mechanized logging which add to the history of other parts of the nation are not really a part of local tradition. Mining is on the decline and much of the remains of past life-styles have been obliterated.

Table 2-29 lists the identified historical sites that might be impacted, directly or indirectly, by some identified aspect of the proposed action. The general location of these sites is shown in Figure 2-18. The table reflects the present state of knowledge; undoubtedly other sites will be added to the list as they are recognized as having significant historical interest. Furthermore, a number of historical sites not included in this listing would not be affected by the proposed action. These are predominantly in currently occupied urban areas (Grants Pass, Williams, Kerby, for example) with buildings or residences of historical interest. Historical sites are protected by the same stipulations as archeological sites, and a thorough survey to identify them so they can be protected must be accomplished before any ground-disturbing or title-alienating activity can be undertaken.

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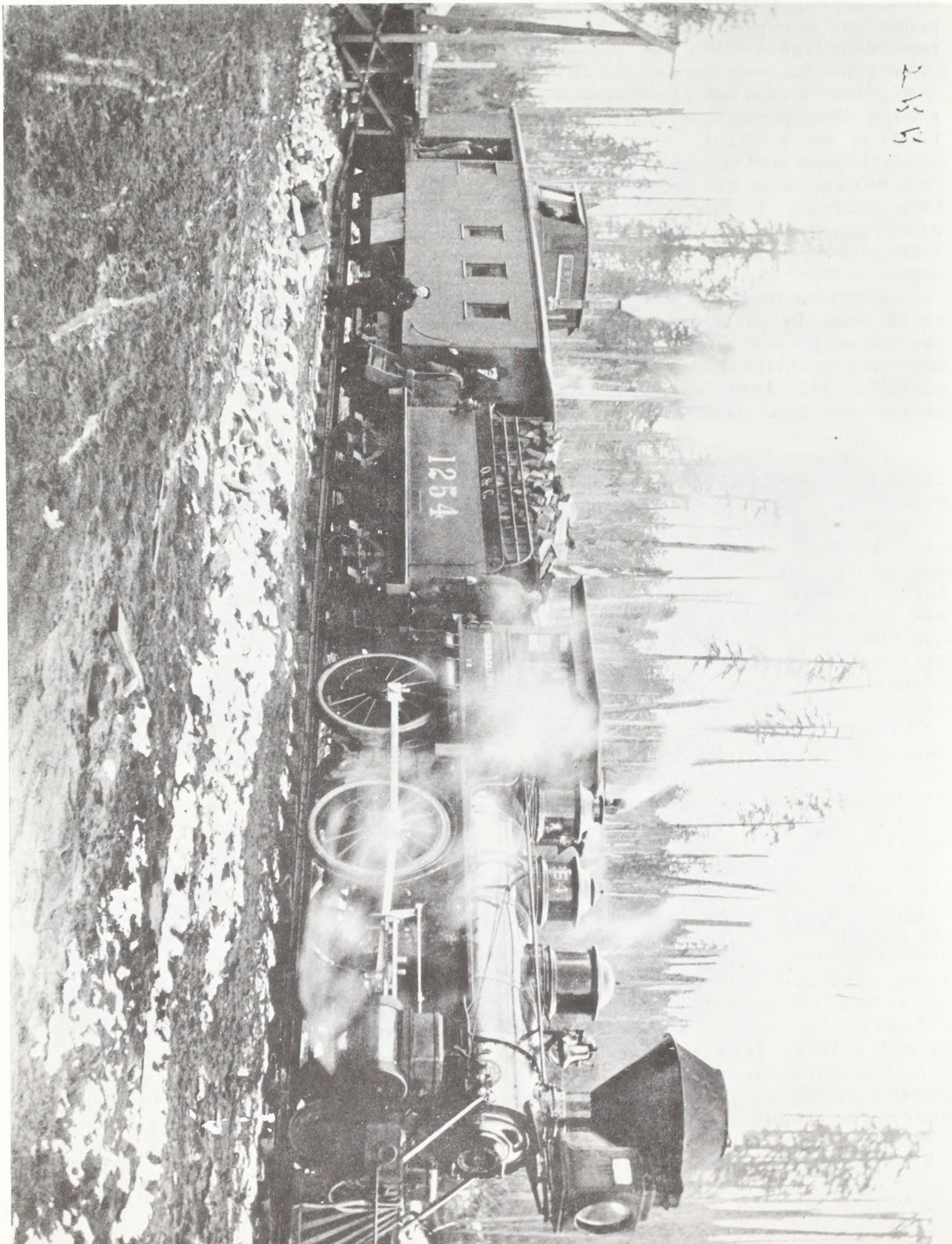


Table 2-29

Historical Sites Within the Josephine SYU

Historical Sites National Register	Attributes/Condition	Jurisdiction	Significance Rating
Rogue River Ranch (on register)	Turn of the century farmstead in good condition	Public	S-1
Whiskey Creek (on Register)	Miner's cabin built in 1880s. In good condition	Public	S-1
Wolf Creek Inn (on Register)	An important stop on the early North-South route. Dates from 1856, used as hostelry. Good condition	State	S-1
National Register Pending Status			
Grave Creek Bridge (approved by State Historic Preservation Office for nomination to National Register)	Covered bridge in very good condition, 1920 last remaining covered bridge on Pacific Highway and in Josephine County	Josephine Co.	S-2
Non-National Register			
Townsites			
Allen Town	Almost obliterated: Occupancy trespass Mining Frontier, 1852	Public	S-2
Browntown	Obliterated. Once a mining town. Occupancy trespass, 1852	Public	S-4
Waldo Townsite	No remains of town: Monument has been erected by Josephine County Historical Society, 1853	Private	S-2
Golden	Frame buildings in good condition. Marker erected by Josephine Co. Historical Society	Private	S-2
Sucker Creek Townsite	1853 and 1856, Mining frontier	Private	S-4
Perkins Ferry	First permanent white settlement in the Basin; near Grants Pass	Private	S-4
Cemeteries			
Allen Cemetery	Good	Public	S-2
Waldo Cemetery	Some graves identifiable	Public	S-2
Tuller Graves	Being researched. Graves inadvertently destroyed during road construction prior to BLM jurisdiction	BLM	S-4
Deer Creek Cemetery	Some graves identifiable	Public	S-2
Grave Creek Cemetery	Some graves identifiable	Public	S-3

Table 2-29 (Continued)

Transportation Routes			
California & Oregon Coast Railroad	Portions of roadbed remain. Operated 1911-1956	Multiple	S-4
Jacksonville-Crescent City Trail	1860, Mining Frontier and Transportation route	Multiple	S-4
Twogood & Harkness Stage House NE of Grave Bridge	Original structure erected 1857	Private	S-3
Applegate Trail	Original Applegate Trail of 1846 was the early day route through southern Oregon	Multiple	S-1
Oregon-California Stage Road	Major frontier transportation route	Multiple	S-4
Mining/Gold Workings			
Benton Mine	Partial remains of gold mine, 1893, Wolf Creek vicinity	Private	S-3
Galice & Old Channel Mine	Existing resort area & richest hydraulic placer mines, 1852, scattered debris from placer and hydraulic mining evident	Private	S-3
Hansen Mine	Some buildings still standing. Occupancy trespass problem	BLM	S-3
Cohen Mine	Extant mining claim cabin & mining equipment dates back to 1920 or earlier	Private	S-3
Almeda Mine	Mining frontier 1908-1916; Wolf Creek vicinity	Private	Undetermined
Waldo gold workings	Gold workings of the 1850s; few remains	Private	S-3
Democrat Gulch gold workings	Gold workings of the 1850s; few remains	BLM	S-3
Forts			
Fort Lamerick	An encampment used in 1856. No visible remains	Private	S-4
Fort Briggs Site	Near Sucker Creek/Cave Junction, 1855-56; military & Indian affairs	Private	S-4
Fort Leland	On Grave Creek; 1855-56; military & Indian affairs only remnant is the well which served this stockade	Private	S-4
Fort Vannoy	1855-56; military and Indian affairs	Private	S-4

Table 2-29 (Continued)

Battles			
Battle of Eight Dollar Mountain	Site of Rogue River Indian War Battle	Private	S-4
Battle of Galice Creek	Site of important Rogue River Indian War Battle	Private	S-4
Battle of Hungary Hill	Site of Rogue River Indian war battle of 1855; five unmarked graves remain in T. 345 R. 6 W Section II	BLM	S-4
Other Historic Sites			
Kerby Museum	Josephine Co. Museum includes restored late 19th century home. Classic architecture, late 1870s	Josephine Co.	S-2
Mt. Peavine Lookout	Lookout tower in good condition	BLM	S-2
Waldo Lookout	Lookout tower still in operation	State	S-2
Sutherland Brick Works	Ruins of brick kiln	Private	S-3
Zane Grey Cabin	Good. Residence of Zane Grey	Private	S-2
Chinese Rock Works (Galice Creek Mine Tailing)	Galice vicinity, late 1800s, cultural immigrations. Debris from hydraulic and placer mining which commenced in 1852	Private	S-3
Indian Mary Park	Granted to Indian Mary in 1894 in recognition of gratitude to her father, Umpqua Joe, who saved white settlers from a planned massacre	Josephine Co.	S-4

CRES ratings S-1 to S-4 for historical resources are slightly different than those for archeological. Definitions are as follows:

S-1. National Register Significance. In general, S-1 properties show a clear potential for yielding, or have yielded, highly significant scientific/educational information and are clearly important in terms of national, State, or local history. Normally the S-1 rating will be assigned to those properties which are in relatively good condition, and are unique or representative, and/or have important associations.

S-2. Mid-Significance. Assign S-2 rating if resource does not satisfy S-1 requirements. S-2 properties are usually in only fair condition. They are not particularly unique, representative, nor do they have important associations. Many recently abandoned western homesteads, small mining camps, cemeteries, railbeds, roads and trails will fall here.

S-3. Low Significance. Assign the S-3 rating if the main worth of the property is its potential for contributing data in regards to solving larger problems of areal human usage and environment. Properties such as dumps, isolated domestic and non-domestic buildings and materials, small mining operations, will often fall here.

S-4. Data Property. The S-4 rating is assigned only to properties that have no physical remains in the field and/or have lost field integrity.

Source: Bureau Planning Documents

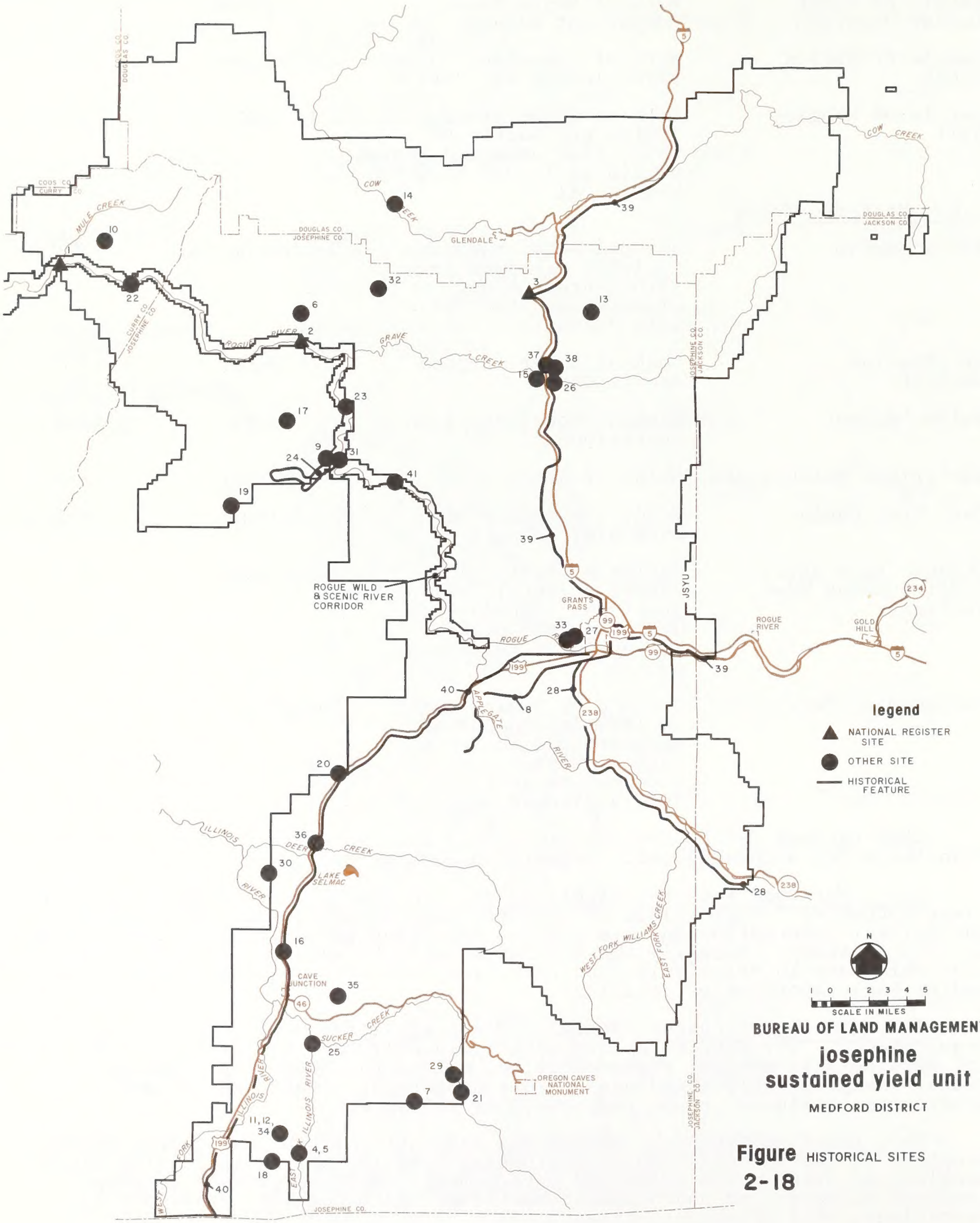


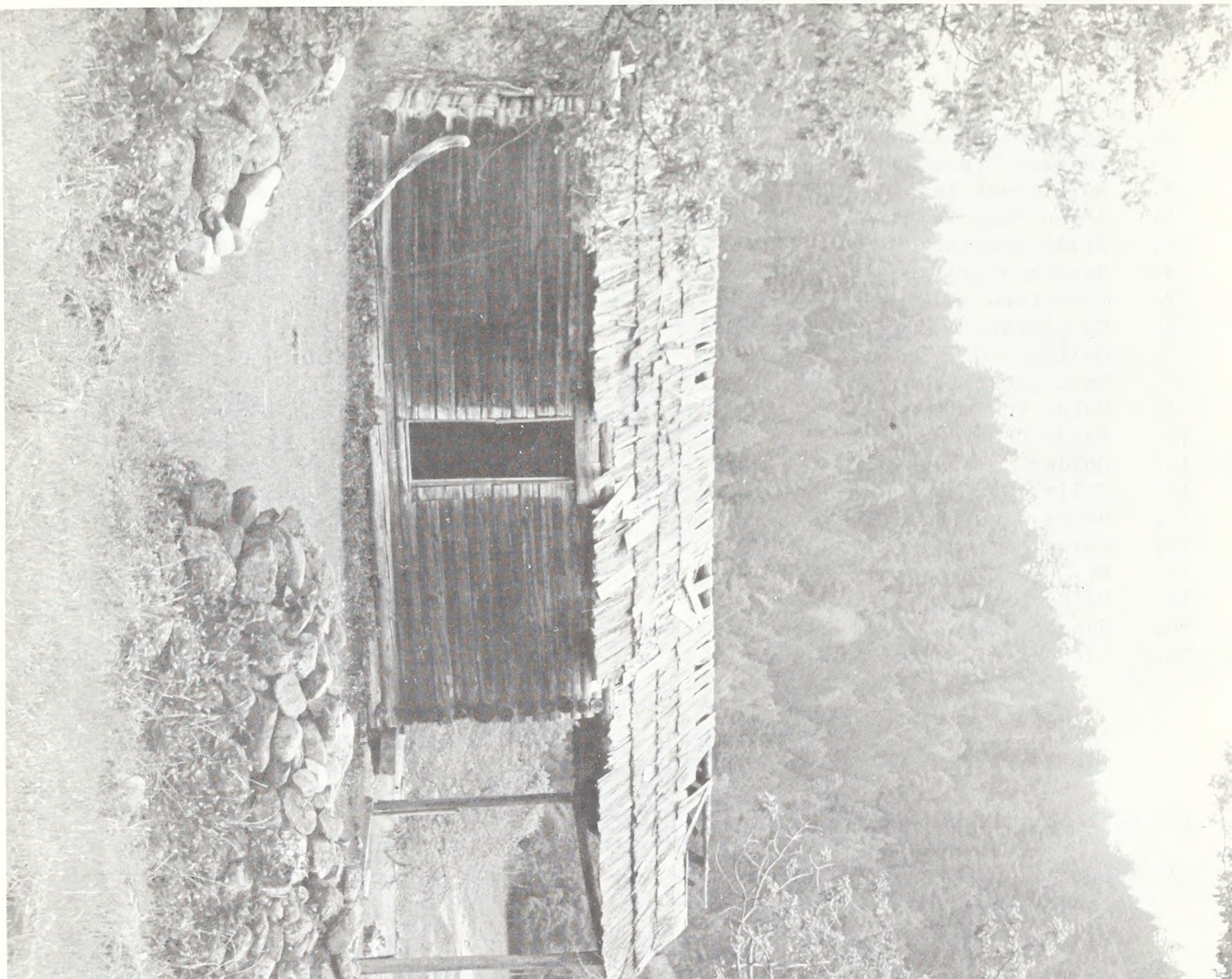
Figure 2-18 HISTORICAL SITES

Figure 2-18
Historical Sites
(Legend)

1. Rogue River Ranch1/
2. Whiskey Creek Cabin1/
3. Wolf Creek Inn1/
4. Allen Town
5. Allen Cemetery
6. Benton Mine
7. Browntown
8. California & Oregon Coast Railroad
9. Galice & Old Channel Mine
10. Fort Lamerick
11. Waldo Townsite
12. Waldo Cemetery
13. Golden
14. Tuller Graves
15. Grave Creek Bridge2/
16. Kerby Museum
17. Mt. Peavine Lookout
18. Waldo Lookout
19. Hansen Mine
20. Sutherland Brick Works
21. Cohen Mine
22. Zane Grey Cabin
23. Almeda Mine
24. Chinese Rock Works (Galice Creek Mine Tailings)
25. Fort Briggs Site
26. Fort Leland
27. Fort Vannoy
28. Jacksonville - Crescent City Trail
29. Sucker Creek Townsite
30. Battle of Eight Dollar Mt.
31. Battle of Galice Creek
32. Battle of Hungary Hill
33. Perkins Ferry
34. Waldo Gold Workings
35. Democrat Gulch Gold Workings
36. Deer Creek Cemetery
37. Grave Creek Cemetery
38. Twogood and Harkness Stage House
39. Applegate Trail
40. Oregon-California State Road
41. Indian Mary Park

1/ Currently listed on the National Register

2/ Approved by the State Historic Preservation Office for nomination to the National Register of Historic Sites.



Paleontology

Fossils are an important and nonrenewable resource. Vertebrate and certain invertebrate fossils are protected within the scope of the Antiquities Act. While the JSYU has not been thoroughly surveyed, vertebrate, invertebrate, and plant fossils are known to occur.

Fossils found within the JSYU include leaves, mollusca casts, and fossils of mastodon, elephant, bison, and horse. Table 2-30 shows a generalized stratigraphic chart for the Klamath Mountains Province (of which the JSYU is a part). Figure 2-19, which shows fossil-bearing rock outcrops, was devised based upon known reports of fossils and a professional judgment of where fossils are most likely to occur within the JSYU. The following formations within the JSYU are considered fossil-bearing:

1. Jurassic Galice formation Sediments

2. Jurassic Dothan formation Sediments (Fossils identified as Buchia piochii reported)

3. Cretaceous Riddle and Days Creek formations (The clam Buchia and ammonites, coiled fossils like the present day pearly Nautilus, have been reported)

4. Cretaceous Hornbrook formation

5. Eocene Umpqua formation

6. Pliocene-Pleistocene bench gravels

7. Recent Alluvium

None of the known fossils within this area are of remarkable interest. However, all reports of fossil-bearing deposits are required to be checked by qualified personnel to avoid destruction of such resources.

2.1.3.3 Visual Resources

The landscape of the Klamath Mountain physiographic region, in which the Josephine SYU is located, is predominantly rugged. Figure 2-6 shows land relief in the SYU. Although the average elevation of the mountains is about 5,000 feet, some peaks in the southern part of the SYU, in the Siskiyou Mountain Range, rise to over 6,500 feet. Steep slopes, narrow canyons and broad valleys associated with the Rogue River and Cow Creek watersheds are the natural landforms on which human use occurs and which can be viewed from roads, trails, or rivers.

Characteristic Landscapes

Four different characteristic landscape associations are discernible within Josephine SYU: upland timber, narrow corridors, Rogue River Canyon, and valley bottoms. Figure 2-20 shows the location of each. Visual features are shown in Table 2-31.

Upland Timber

The upland timber characteristic landscape is the predominant landscape association of the Josephine SYU. Mountains with narrow ridgelines, very steep slopes and many incised canyons are dominant features. Surface texture, however, is very even; rock outcrops are apparent only in the river canyons or along ridge tops.

Table 2-30

Generalized Stratigraphic Chart for the Klamath Mountains (McKee 1973; Ramp 1969)

ERA	SYSTEM OR PERIOD	FORMATION	DESCRIPTION
CENOZOIC	QUATERNARY		Bench gravels and alluvium along streams and glacial moraine and till. Auriferous gravels (in former stream Channels)
	TERTIARY		Old gravels - on Klamath peneplain Small intrusions of dacite porphyry and nepheline syenite
		TYEE	Coal-bearing shales, sandstone and conglomerate extends as far south as Bald Knob on north side of Rogue River
		UMPQUA	Well-bedded sandstone, siltstone, and some massive conglomerate
MESOZIC	CRETACEOUS	HORNBROOK	Marine beds in Medford-Ashland area and Upper Grave Creek: Arkosic sandstone, siltstone, and conglomerate
		Myrtle Group: DAYS CREEK; RIDDLE	Dark siltstone and sandstone; minor basalt and andesite, chert, limestone, conglomerate. Marine Myrtle Creek area and equivalent strata in coastal belt.
	JURASSIC	NEVADAN OROGENY	Intrusive rocks: periodotite, serpentinite, gabbro, diorite, granite, pegmatite
		GALICE	Dark gray mudstone, siltstone, and fine-grained sandstone. Marine fossils. Metamorphoses locally, including Colebrooke schist east of Gold Beach. Widespread in eastern Jurassic Belt.
		DOTHAN	Dark graywacke sandstone, lesser shale, conglomerate, chert, pillow basalt. Marine. Probably equivalent to Galice. Forms Western Jurassic belt from near Roseburg past Brookings into California.
		ROGUE	Submarine flows, breccias, and tuffs of basaltic and andesite composition, locally weakly altered to greenstone. Widespread in eastern Jurrasic belt.
	TRIASSIC	APPLEGATE GROUP	Metasediments, metavolvanics, and intrusives. Age of lower part uncertain. Mostly andestic and basaltic flows and pyroglastic rocks. Sandstone, conglomerate, siltstone, limestone, chert. Marine. Weakly metamorphosed. Widespread in eastern Klamath Mountains.
PALEOZOIC		PRE-TRIASSIC SCHIST	Age uncertain. Marine sedimentary and volcanic strata metamorphosed to hornblends and mica schist. Southwest of Ashland.

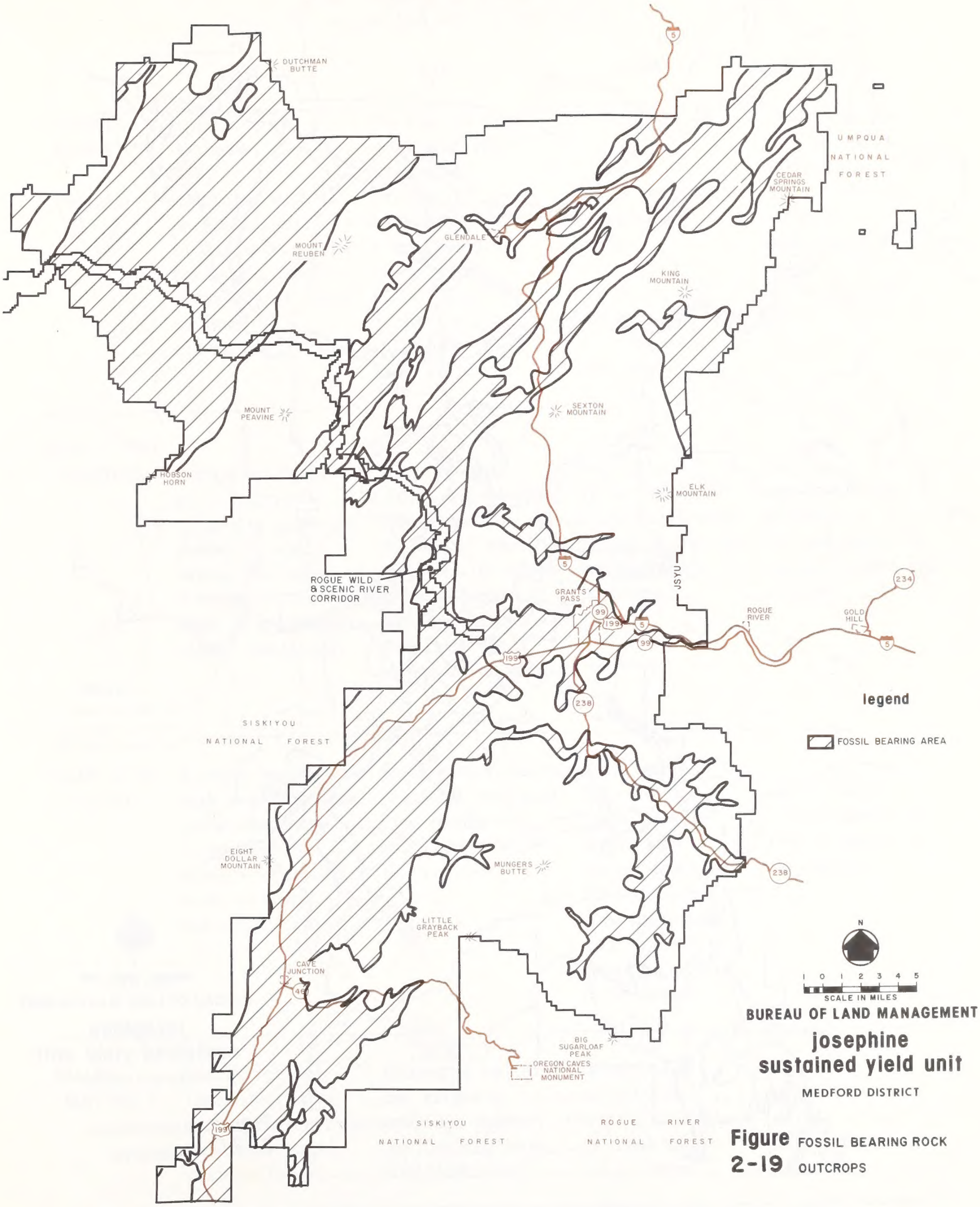
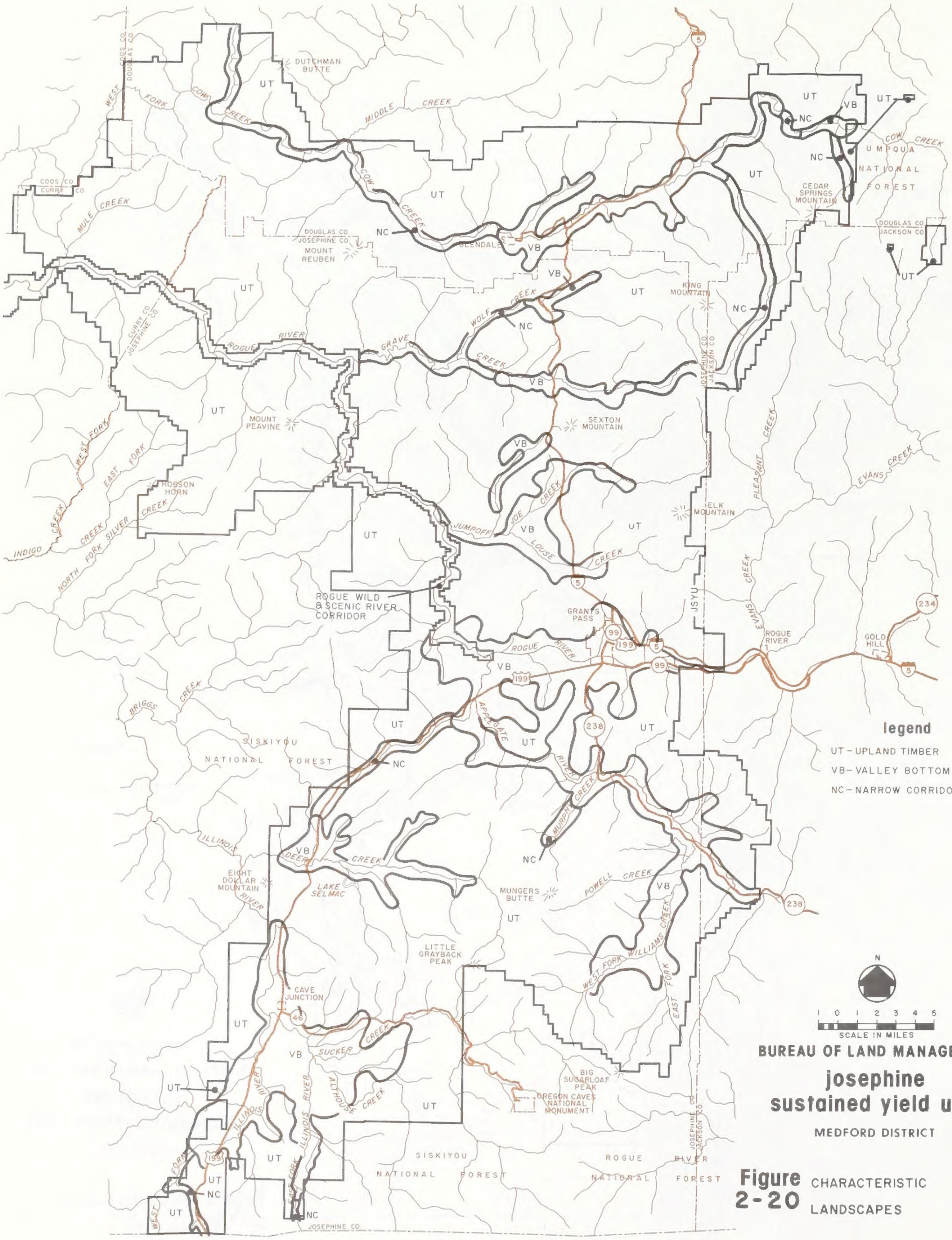


Figure 2-19 FOSSIL BEARING ROCK OUTCROPS



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josephine sustained yield unit

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Figure 2-20 CHARACTERISTIC LANDSCAPES

Table 2-31

Visual Features of Characteristic Landscapes within the JSYU

	FORM	LINE	COLOR	TEXTURE
UPLAND TIMBER	Form is quite dominant; Mountains with narrow ridgelines; slopes and canyons hardwoods create a variety of forms at lower elevations.	Natural patterns are relatively triangular; Narrow horizontal ridgelines; steep angled slopes and incised canyons with vertical line influence.	Timber portrays greens and browns; soils are light tan to red and highly reflective of light when disturbed.	Vegetative texture is dominant; very even, rock outcrops apparent only in river canyons or along ridge tops.
NARROW CORRIDORS	Narrow valley with a stream of gentle gradient cascading water a strong feature. More variation than in upland timber landscape.	Steep slopes within the recreational portion of the Rogue; gentle gradients in other areas; surface drainage patterns reinforce the dominance of vertical line.	Many colorful shrubs and hardwoods; more color variation than in upland timber landscape.	Valleys characterized by the presence of timber and water; strong vegetative texture.
ROGUE RIVER CANYON	A steep canyon with a narrow corridor dominated by spectacular scenery of water, rock outcrops, and vegetation.	Steep canyon walls reinforce vertical line dominance; shorelines reinforce line.	Great variety in color; black, green, reddish brown outcrops; south-facing slopes have hardwoods interspersed with openings of red-brown earth.	Rock outcrops, north facing slopes have more evenly-textured vegetation.
VALLEY BOTTOMS	Gently rolling landforms; man-made modifications apparent; broad valley floors.	Geometric patterns and ridgetop openings denote obvious man-made modifications.	Great color variety as a result of variety of land uses.	Great variety of texture as a result of land use variety.

Soils are colored light tan to red and are highly reflective of light when disturbed, a fact that makes road construction and cable or tractor logging skid roads contrast sharply with the natural landscape. Forest management activities of clearcutting and shelterwood timber harvesting with associated road systems create strongly contrasting geometric forms and vegetative texture changes that are not harmonious with the natural landscape.

Vegetation is a mixed conifer forest type of pine and fir with associated hardwoods, primarily oak, madrone, and chinkapin. At the lower elevations conifers are dominant, but large areas of oak and madrone are discernible. The hardwoods create a variety of natural forms not evident at higher elevations within the upland timber landscape and add greater visual variety and interest with different textures and colors. Madrone is an outstanding example with its shaggy, cinnamon-colored bark. At higher elevations vegetation is almost entirely mixed conifer. Hardwoods, while present as scattered trees, are not a visually apparent element of the vegetation. Here there is a noticeable difference in tree heights, branching patterns and foliage colors in light green pines to dark-colored fir trees.

Ridgeline roads offer panoramic views of the rugged terrain and valley bottoms. Structures are absent or not very noticeable in the upland timber landscape. Fire lookout towers are far away and painted in muted colors.

Narrow Corridors

This characteristic landscape, found as islands within the upland timber landscape, is typified by a narrow valley with a stream of gentle gradient. Alluvial terraces along the stream have been utilized to locate roads for access to upland timber areas or to traverse topographic barriers, as shown in the following photo.

In addition to the roadways, this landscape is distinctive because of its rugged, constantly changing features within an enclosed scene. The general presence of water cascading through the canyon bottom becomes a strong feature of both sight and sound. Plentiful water results in a multitude of fine textured shrubs and hardwoods, providing more variation of form and color than can be found within the upland timber landscape.

Structures in this landscape are roadways with related culvert and bridge installations. Culvert pipes or bridges which do not blend with the natural landscape in design or color may create a visual intrusion. Timber harvesting practices in this characteristic landscape have a tendency to create unsightly blockages of logging debris along the creek bottoms.

The recreational portion of the Rogue River from Hellgate to Grave Creek is included in this landscape type. Steep forested slopes and expanses of dark-colored rock enframe the river. Structures include salmon boards which jut from the river bank, recreational homes, and recreation sites with boat launch ramps and associated facilities.

Rogue River Canyon

The Rogue River is the most interesting scenic feature in the Josephine SYU. From the eastern boundary of the SYU to Hellgate, the Rogue is included in the valley bottom characteristic landscape; from Hellgate to Grave Creek Bridge, the river is included in the narrow corridor landscape. The section of the Rogue classified as "wild" has a distinct character of its own.

Beginning at Grave Creek, the Rogue River Canyon can be viewed only from the Rogue River Trail or from the river itself. The scenery becomes spectacular. The landscape is primarily enclosed as the steep canyon walls limit horizontal views. Form and texture are varied, with forested slopes, rock outcrops, and gravel bars. Rock outcrops vary in color, with blacks, greens, and reddish browns predominating. Vegetation varies depending on slope aspect; northfacing slopes tend to be more even-textured with mature conifers, while southfacing slopes are more nubbly with shrubs and oaks interspersed with openings of red-brown earth. The river itself is a focal point and adds to sight and sound with many rapids and waterfalls. Along the river are several historical buildings such as Zane Grey's Cabin, Whiskey Creek Cabin, and Rogue River Ranch. These add to the scene and are not considered to be intrusions.

Valley Bottoms

This characteristic landscape encompasses ancient meander plains and alluvial areas adjacent to significant streams. The association includes not only broad valley floors but rolling hills within and peripheral to the valley. Water is present within this landscape but it is not always a dominant feature due to vegetative screening and road placement.

Vegetation is the dominant feature of the valley bottom landscape. Human settlement has resulted in great variety, with crops, irrigated pasture, shrubs, hardwoods and conifers. An interesting mosaic has been created due to different land uses of the various owners. This great variety of vegetation creates multitudes of color and textures throughout the seasonal changes of spring, summer, and fall.

The valley bottom is predominantly in private ownership or under the control of local and State governments. Structures are commonly present and have a high impact on views in this landscape. Older structures exemplary of early settlement may have great cultural and scenic value. Poorly maintained structures and areas of greater development density may leave a negative impression.

Scenic Values

All public lands are assumed to have some scenic value. Some areas are more scenic than others. While esthetics and scenic values are a matter of personal judgement and individual taste, BLM has devised criteria to evaluate scenic quality (BLM Manual 6310). The parameters are topography, color (of soil, rock vegetation, etc.), water, vegetation, uniqueness, and absence or presence of intrusions. Variety within these parameters gives an area more scenic value. The presence of water

Class A Scenery along the Wild Rogue

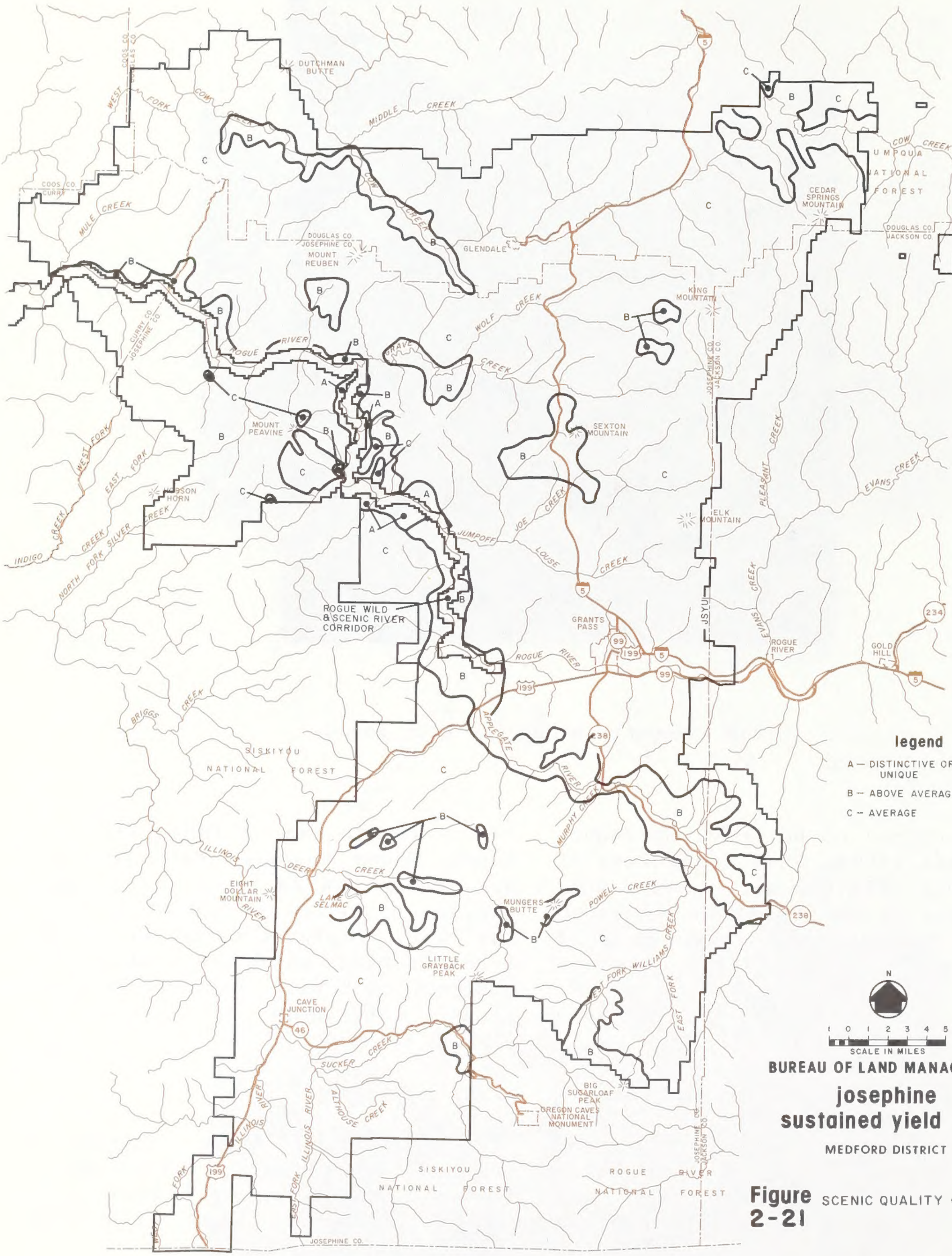
is considered to be very important. All lands within JSYU regardless of ownership (855,985 acres) were rated according to the procedures described in BLM Manual 6310. Figure 2-21 shows the scenic quality classes.

Class A Scenery

Highly scenic, distinctive or unique landscape (Class A) has been identified along the Rogue Wild and Scenic River. The high scenic value of this portion of the Rogue was a factor leading to inclusion of the river within the National Wild and Scenic River System. Water hurtling between canyon walls, rock outcrops, rapids, a variety of vegetation along the river, historic sites, and steep, forested hills which are unroaded and unlogged are typical features included in the more than 15,500 acres of Class A scenery.

Class B Scenery

Lands rated "B" are considered to be above average in scenic value. These lands usually incorporate scenic river valleys with more



legend

A — DISTINCTIVE OR UNIQUE

B — ABOVE AVERAGE

C — AVERAGE

N

1 0 1 2 3 4 5

SCALE IN MILES

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Figure 2-21 SCENIC QUALITY CLASSES

variety than Class "C" valleys or heavily wooded areas with few intrusions. Approximately 146,000 acres within the Josephine SYU have been identified as having above average scenic value.

Class B Scenery along the Applegate River

Class C Scenery

Most of the JSYU (825,725 acres) is classed as "C", which is average scenic quality for the region. If compared with scenery in other physiographic parts of Oregon or the United States, this acreage might draw a higher rating. However, the bulk of the Josephine SYU is usually comparable with non-coastal Western Oregon. Typically, scenic value "C" land has rolling topography, forested slopes, little or no water visible, roads, scars, residential and agricultural areas, and obvious logging operations.

Typical Class C Scenery in the JSYU

2.1.3.4 Noise

Ambient noise is the all-encompassing noise within a given environment, representing a composite of sounds from all sources, near and far. Wind rustling through leaves, chirping birds and insects, gurgling streams, bugling elk, and other similar noise sources contribute to ambient noise levels deep in the forest. Although no noise level surveys have been conducted within the SYU, other data from similar areas indicate that maximum ambient levels average 35-40 decibels measured on the A scale (dBA). This range is in the faint to moderate level of human audibility (AMF 1971).

A majority of public land within the SYU is devoted to timber production, and noise levels generated within the forest reflect a composite of characteristic sounds. Human intrusion into an environment generally brings about an increase in noise. The increase is more dramatic if motor vehicles are involved. For example, a diesel truck may generate 80-90 dBA, audible for 50 feet from the roadway (U.S. EPA unpublished document). An off-road recreation vehicle may generate noise levels that approach those of the diesel truck, depending on the type of muffler used, size of engine, and the speed of the vehicle.

Logging activities are noisy, as are the supportive construction efforts. Chain saws can be heard for great distances. Logging operations and road construction are temporary noise sources; they contribute to ambient noise levels for the length of time it takes to build the logging road and harvest timber. Sources of noise generation associated with timber harvest include dozers, skidders, chain saws, yarders, loaders, heavy and light trucks, radio communications and human voices.

Dailey and Redman (1975) examined the frequencies and intensities of 11 human-related noises often associated with roadless area use. These intrusive sounds contrast with

natural background noises one would expect to find outdoors (birds, wind, leaves rustling, water). Factors were listed as determinants of how far intrusive noise will travel before being masked by background noise (Harrison 1974). These factors were the loudness and pitch of the intrusive noise and the background noise, and environmental factors such as landform barriers which decrease intrusive noise loudness.

Figures 2-22 and 2-23 illustrate the intensity and frequencies, respectively, of the 11 noises. The sound levels for chainsaw and skidder activity at 50 feet were provided in a study by the Canadian Forestry Service (Myles et al. 1971). Figure 2-24 compares noise levels for chainsaws and skidders. The greater the intensity (loudness) of a noise and the lower its frequency (pitch), the farther it will travel. High intensity noises include the gunshot, chainsaw, skidder, yell, whistle, and trailbike. Low frequency sounds recorded were the guitar, trailbike, and wood chopping. Chainsaw and skidder activity were also determined to produce great variations in frequency. Figure 2-25 compares octave-band noise levels for all logging machines with average octave-band levels for all chainsaws and all skidders tested in the Canadian Forestry Service study.

Intensity of these noises decreases as the noise projects from its source, and certain environmental features would have attenuating effects.

The lower the background noise, the greater the range over which the intrusive noise will be audible. In a mature coniferous forest similar to that within the JSYU, background noise level under low wind conditions, is 35 dBA and about 30 dBA in an alpine meadow. At the bank of a small stream, noise level is 45 dBA.

2.1.3.5 Socioeconomic Conditions

Relationship of Local Entities to the JSYU

Land area and commercial forest area provide an approximate indicator of the relative impact of public land timber programs upon public revenues among counties. Log destinations and trade regions indicate the likely loci of income, employment, population, and public finance impacts.

Regional Analysis

Regional Economic Overview. The southwest Oregon region consisting of Coos, Curry, Douglas, Jackson, and Josephine Counties has an area of 8,147,000 acres. Forests cover approximately 7,022,000 acres, of which 87 percent or 6,129,000 acres are classified as commercial forest-land.

The five counties had a population of about 316,100, 13.5 percent of the State's total, in July 1976. Major towns include Coos Bay (a seaport), Roseburg, Grants Pass (the Rogue River tourist center), Medford (an important industrial and service center for the Rogue River Valley), and Ashland (whose Shakespearean festival is a major attraction each summer).

Important industries in southwest Oregon are mining, ranching, farming, tourism, and timber. Communities rely heavily on the timber industry for employment. The wood products

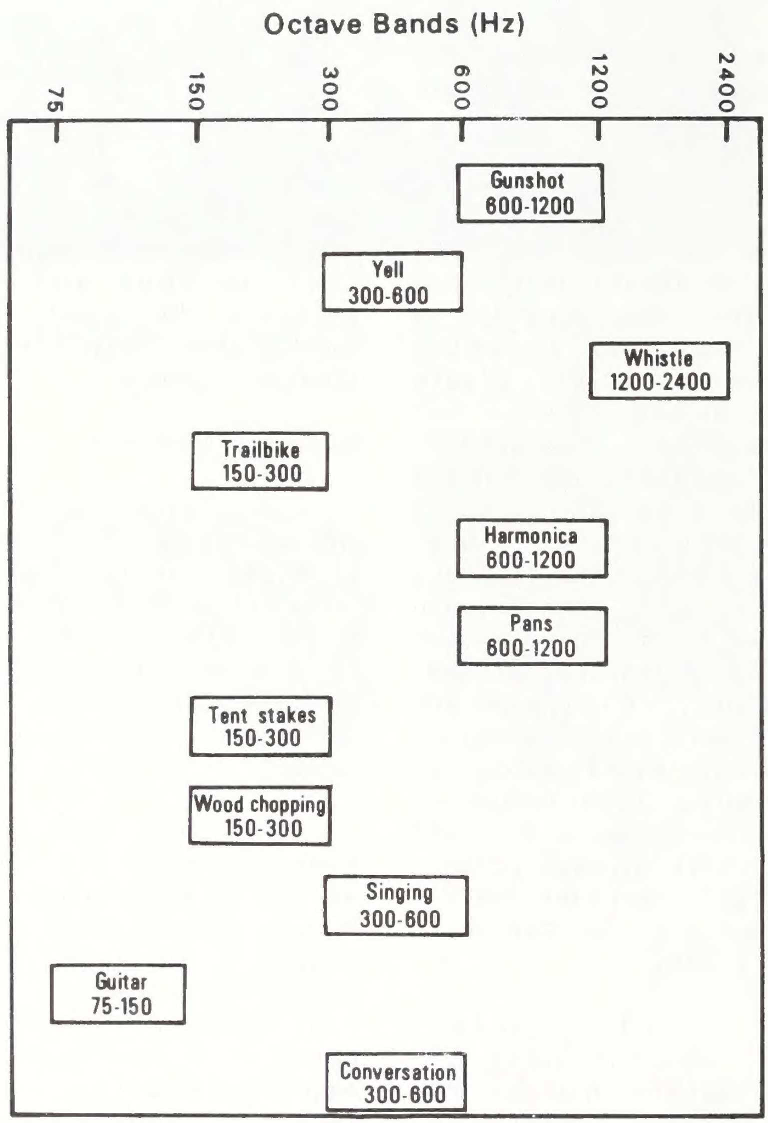


Figure 2-22 OCTAVE BAND FREQUENCY OF ELEVEN HUMAN NOISES

SOURCE: Dailey, Tom & Dave Redman, Guidelines for Roadless Area Campsite Spacing to Minimize Impact of Human-Related Noises 1975.

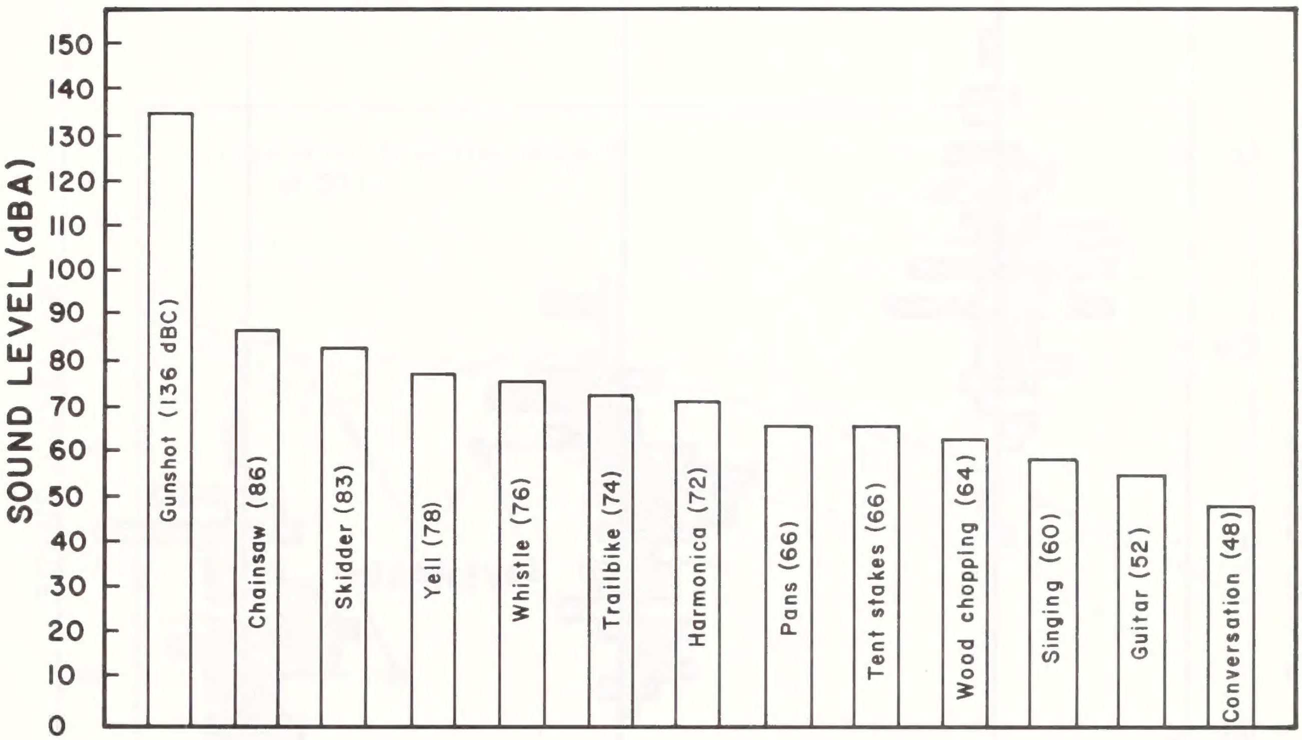


Figure 2-23 **INTENSITY OF THIRTEEN HUMAN NOISES • MEASURED 50 FEET FROM NOISE SOURCE**
SOURCE: Dailey, Tom & Dave Redman, Guidelines for Roadless Area Campsite Spacing to Minimize Impact of Human-Related Noises 1975 & D.V. Myles 1971

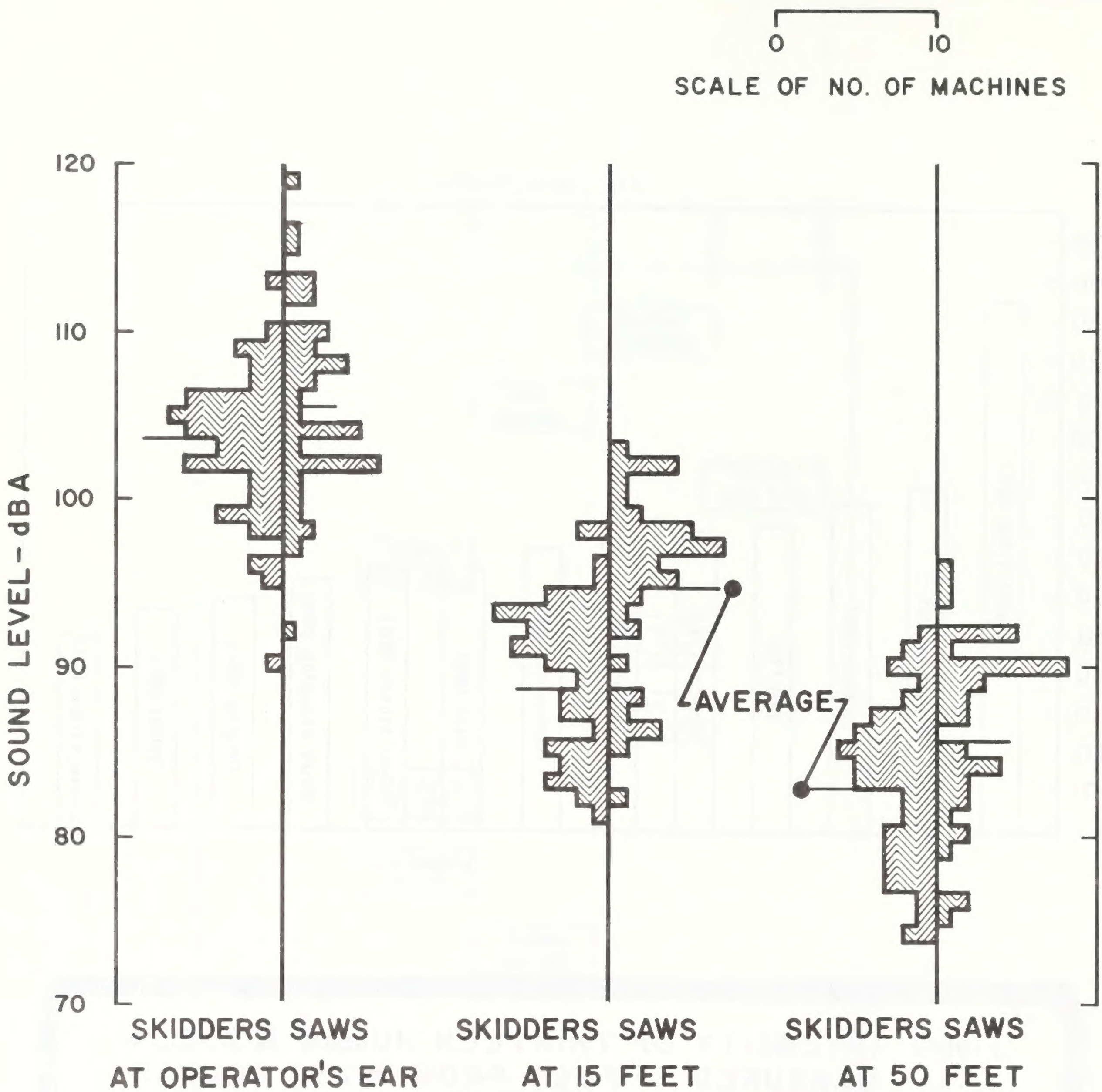


Figure 2-24 HISTOGRAMS FOR CHAINSAWS AND SKIDDERS
SOURCE: D.V. Myles et al. 1971

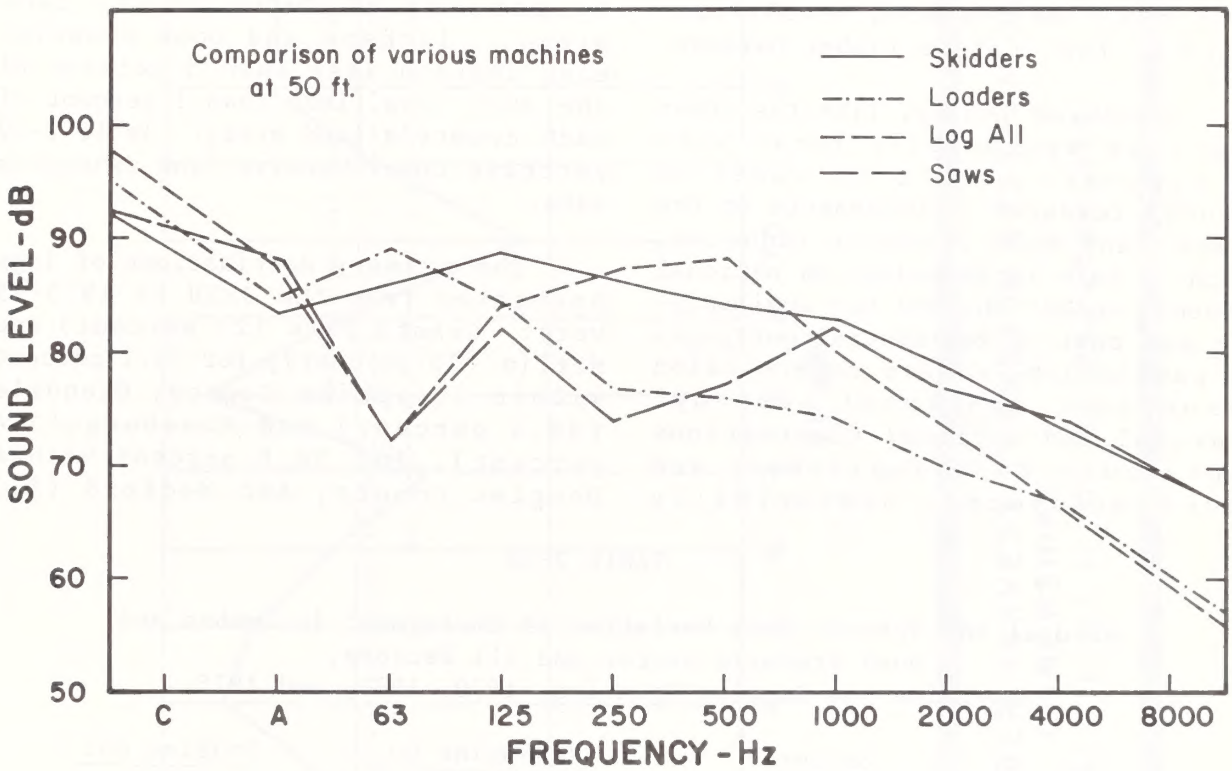


Figure 2-25 COMPARISON OF OCTAVE•BAND SPECTRA FOR ALL MACHINES • AT 50 FEET
SOURCE: Myles et al. 1971

industry employed approximately 21,000 persons during 1975, 17 percent of the area's total employment that year.

Southwest Oregon supplies approximately 5 percent of the nation's lumber and one-fifth of its veneer and plywood (Bassett 1977). During 1970-74, the forests in these five counties produced nearly one-third of the State's timber harvest.

Josephine County, like the other four, is essentially rural with an economic structure based on natural resources. Dependence on the lumber and wood products industry, which in turn is dependent on national economic conditions and the availability and cost of residential mortgages in particular, causes repercussion throughout the local economy. Seasonal and cyclical fluctuations contribute to unemployment and underemployment, historically major problems for the area (Table 2-32 and Figures 2-26 and 2-27).

Land Relationship to JSYU. Josephine County contains 68 percent of the JSYU area (28 percent of Josephine County land area). Douglas County contains 19 percent of the JSYU area (12 percent of Douglas County land area). Curry County contains 9 percent of the JSYU area (4 percent of Curry County land area). Jackson and Coos counties each contain less than 5 percent of the JSYU area (less than 1 percent of each county's land area). Table 2-33 portrays comprehensive land ownership data.

The primary destinations of logs harvested from the JSYU in 1973-75 were: Grants Pass (27 percent) and Merlin (26 percent), for 53.1 percent within Josephine County; Glendale (36.4 percent) and Roseburg (2.4 percent), for 38.8 percent within Douglas County; and Medford (8.1

Table 2-32

Seasonal and Year-to-Year Variation of Employment in Lumber and Wood Products Sector and All Sectors, Josephine and Douglas Counties, 1970, 1974, and 1975.

Year	Sector	Josephine Co.	Douglas Co.
Seasonal			
1970	Lumber & Wood	10%	5%
	All	8	6
1974	Lumber & Wood	14	7
	All	7	4
1975	Lumber & Wood	17	7
	All	9	6
Year-to-Year			
1970-1976	Lumber & Wood	11%	7%

Source: Derived from data in Oregon, State of, Oregon Covered Employment & Payrolls by Industry. County, and Month (appropriate years), R.S. Publication 21, Employment Division, Salem, Oregon.

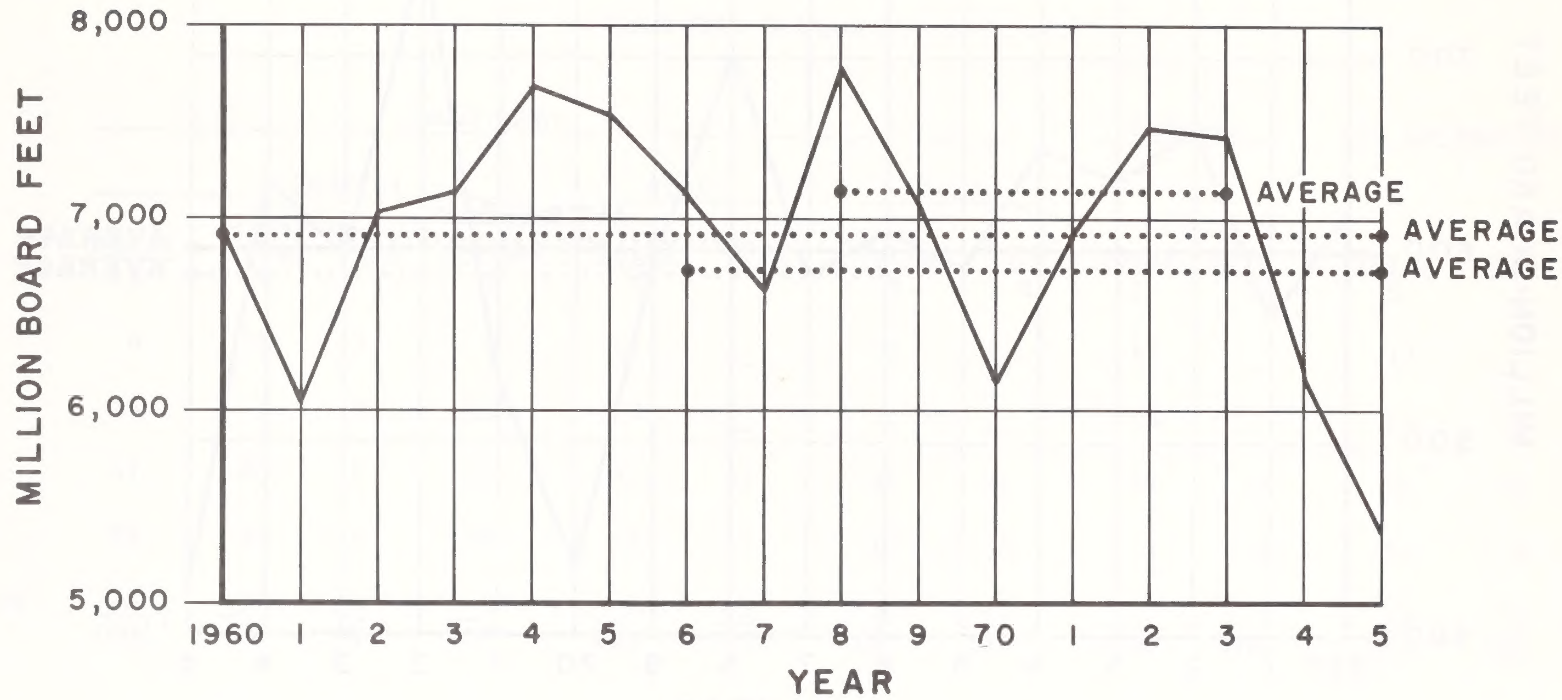


Figure 2-26 TIMBER HARVEST TRENDS IN WESTERN OREGON • ALL OWNERSHIPS

SOURCE: Lloyd et al Jan. 1962 • Dec. 1976

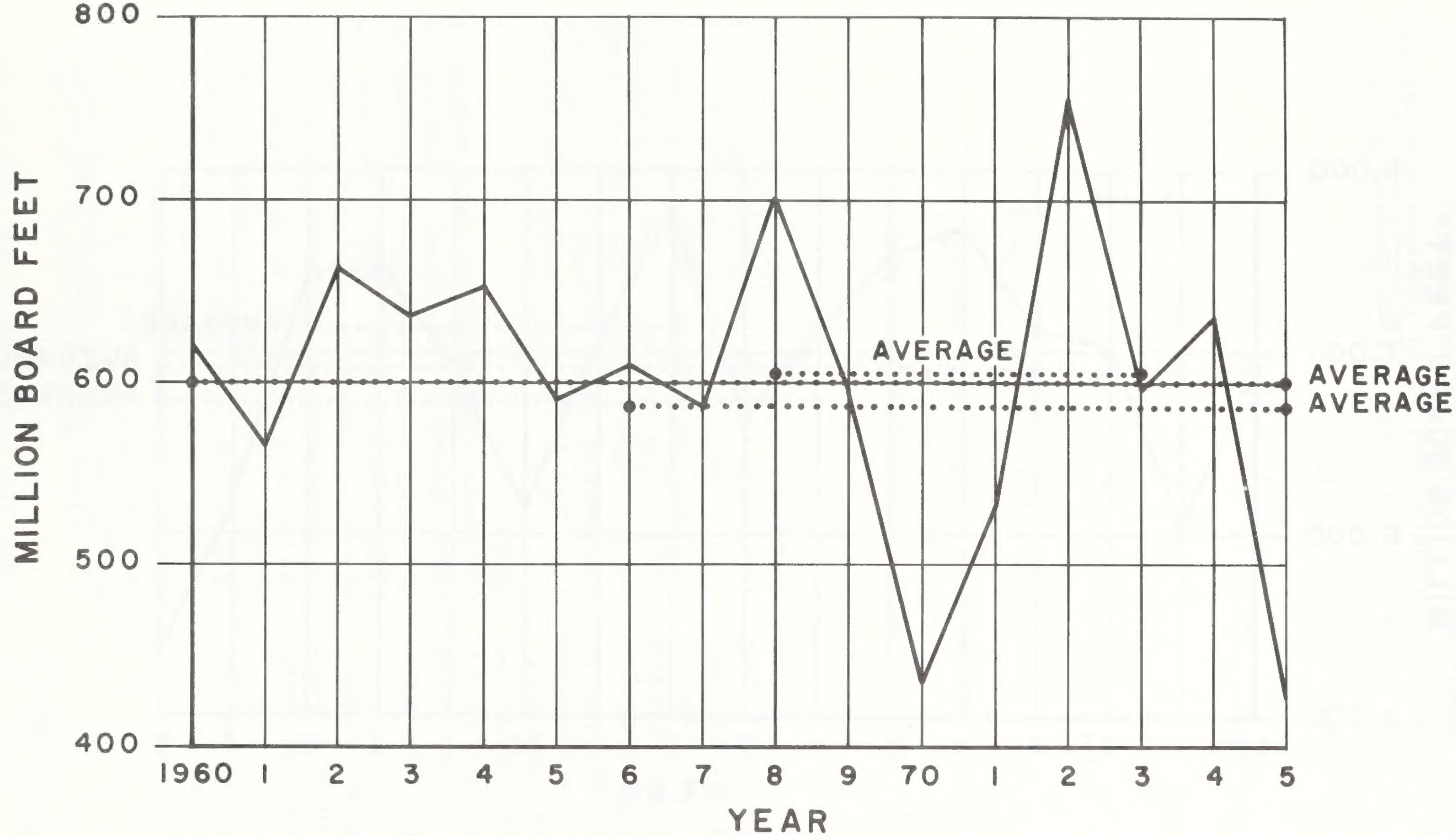


Figure 2-27 TIMBER HARVEST TRENDS • JACKSON & JOSEPHINE COUNTIES • ALL OWNERSHIPS
SOURCE: Lloyd et al. Jan. 1962 • Dec. 1976

Table 2-33

Percentage of Each Selected Land Ownership Category in Southwest Oregon by County circa 1973-75

Ownership Category

County	Government								Private		All categories	
	Federal				State		Local					
		Public		National								
	Total %	Total %	JSYU %	Forest %	Total %	JSYU %	Total %	JSYU %	Total %	JSYU %	Total %	JSYU %
Coos	6	10	1	3	47	—	23	—	18	—	13	—
Curry	16	4	9	25	8	—	2	—	10	—	13	4
Douglas	41	40	19	41	35	47	31	22	39	22	40	20
Jackson	22	26	4	18	4	4	10	4	23	4	22	4
Josephine	16	19	68	3	6	49	34	74	10	74	13	72
	100 1/	100	100	100	100	100	100	100	100	100	100	100
CCDJJ 2/	47	(20)	(5)	(27)	2	—	1	5	50	5	100	10

1 Components may not add to 100 due to rounding.

2. Coos, Curry, Douglas, Jackson and Josephine Counties, percentage of total land area by ownership category.

Source: a. For county-wide estimates: Loy et al. 1976, pp. 20 and 72.
b. For Josephine Sustained Yield Unit: BLM, Josephine Planning Area Analysis, Medford District Office, 1977.

percent), the only Jackson County destination (Table 2-34). Origins and destinations of logs from all sources are listed in Table 2-35.

<u>Distribution of Commercial Timberland and Timber Harvest.</u> Public lands account for 22 percent of the commercial timberland in the area encompassed by Coos, Curry, Douglas, Jackson and Josephine Counties. Private lands account for 43 percent of the acreage while 33 percent is national forest land (Bassett 1977).

Bassett (1977) indicates that during 1975, BLM-administered public lands in Josephine County accounted for 32 percent of that county's commercial timberland, compared with 35 percent for national forest, 5 percent for "other" public, and 28 percent for private lands. Comparing the above estimates with data used to develop Table 2-33, it appears that national forest lands include higher proportions of commercial timberlands than do either private or BLM-administered public lands. Because of the inconsistency between percentages of land as compared to the percentage shares of commercial forest land, one may conclude that relative land area is not a totally reliable indicator of timber-related economic impact potential. Public lands in Josephine County contain 37 percent and 52 percent of that county's timber growing stock and sawtimber, respectively (Table 2-36).

Of all timber harvested in 1970-74 in Josephine County, public lands were the source of nearly 50 percent. For the five southern Oregon counties, public lands contributed about 25 percent of timber

Table 2-34

Destination of Logs Harvested from Public Lands in the Josephine SYU, 1973-75 Averages

Destination	Annual Average 1973-1975 (MMBF)	Percent of Josephine MU Harvest 1973-95
Grants Pass	34	27%
Merlin	33	26%
Josephine Co.	67	53%
Glendale	46	37%
Roseburg	3	2%
Douglas Co.	49	39%
Medford	10	8%
Jackson Co.	10	8%
Total Processed	126	100%

Source: BLM, Josephine Planning Area Analysis, Medford District Office, 1977.

Table 2-35

Destinations and Sources of Logs, All Ownerships, Received in Josephine and Douglas Counties, 1972

Destinations of Logs Harvested

Site of Harvest	Josephine County MBF	Josephine County Percent	Douglas County MBF	Douglas County Percent
Josephine County	113,141	60%	3,609	1%
Douglas County	32,699	17	1,062,550	70
Coos, Curry and Jackson County	41,911	22	213,935	14
Elsewhere	2,218	1	229,067	15
Total	189,969	100	1,509,161	100

Sources of Logs Processed

Destination	Josephine County MBF	Josephine County Percent	Douglas County MBF	Douglas County Percent
Josephine County	113,141	47%	32,699	3%
Douglas County	3,609	1	1,062,550	88
Coos, Curry, and Jackson Counties	92,987	38	101,054	8
Elsewhere	32,972	14	6,224	1
Total	242,709	100	1,202,527	100

Source: Derived from: Schuldt et al. 1974

Table 2-36

Percent of Growing Stock and Sawtimber on Commercial Forest Land by County, Total and Public Lands, Southwest Oregon January 1, 1975

	S.W. Ore.[1] Counties	Coos	Curry	Douglas	Jackson	Josephine
		County				
		Percentage				
Growing Stock[2] (million cubic feet)	23,251					
All ownerships % of Region[3]		14	11	49	17	10
Public Lands						
% of Region	26%	4	1	12	4	4
% of County	-	31	10	25	25	37
Sawtimber[4] (MMBF) (Scribner)	104,995					
All Ownerships % of Region		17	11	51	15	7
Public Lands						
% of Region	29	5	1	15	4	4
% of County	-	33	11	29	28	52

1/ Coos, Curry, Douglas, Jackson and Josephine Counties.

2/ Includes trees 5.0 inches d.b.h. and larger.

3/ Percentages may not add to total due to rounding.

4/ Includes trees 11.0 inches d.b.h. and larger.

Source: Derived from: Gassett 1977, Table 9

harvested during the same period (Table 2-37). Because logs are shipped across county lines, harvest data do not adequately portray dependence of the local economy. For example, Josephine County mills processed 28 percent more timber during 1972 than was harvested from Josephine County timberlands (Schuldt 1974).

During 1968, timber harvested and timber processed in Josephine County were approximately equal; however, of the total processed, only 60 percent was harvested from Josephine County forests (approximately 47 percent of timber processed in Josephine County during 1972 originated in the county). Inferences regarding the local economic base dependent upon timber harvested must reflect differences in ratios of timber processed to timber harvest, due to intercounty log flows.

Location of Primary Log Destinations. Glendale is on the southern edge of Douglas County, adjoining Josephine County, 26 miles and 48 miles from the regional service centers of Grants Pass and Roseburg respectively. Glendale is near Interstate Highway 5, at a point 55 miles north of Medford, which is the nearest metropolitan service center (Loy et al. 1976, p. 100).

Regions to be Described

Due to the relationship of the JSYU boundaries to county areas, log destinations, location of commercial timberlands, and trade and service regions, the primary focus of the discussion of socio-economic factors will be on Josephine County. Secondarily, the Douglas County social and economic attributes likely to be related to the proposed action will be described. Coos, Curry, and Jackson Counties will be addressed minimally.

For all the following discussion of social and economic phenomena, geographic areas are selected, to the extent possible, based upon appropriateness to the probable social or economic consequences of public land uses within the JSYU. In all cases, Josephine County is recognized because it is the primary impact region and data are available covering the county, which is within the boundaries of the JSYU. Glendale, in Douglas County, is addressed since it is a major log destination.

In many cases, the Medford Timbershed (Jackson and Josephine Counties) is used since that is the area for which projections of timber yield are available.

The absence of uniformly appropriate (to the JSYU) social and economic data necessitate fluctuation in geographic area discussed depending upon the subject or locations likely to be affected.

Population Characteristics

The population of Josephine County in 1970 was 35,746, up from 29,919 in 1960. Estimated population in 1976 and 1977 was 47,000 and 50,900 respectively (PSU, CPRC, January 1977 and January 1978). The county population is projected to increase to 55,700 by 1980 and 71,600 by 2000.

Population density averages 22 persons per square mile, ranging from 1,780 in and near Grants Pass to .3 in remote parts of the unit. Six percent of the population lives on farms, 42 percent is rural non-farm,

Table 2-37

Timber Harvest, Total, and Percent from Public Lands, Josephine County and Southwest Oregon[1] 1970-1975 and Average

	Josephine Co.			Southwest Ore. Counties		
	Total MMBF	Public Lands MMBF	Percent	Total MMBF	Public Lands MMBF	Percent
1970	121	46.5	38.4	2,654	625.6	23.6
1971	105	50.6	48.2	3,058	839.6	27.5
1972	194	113.7	58.5	3,058	811.6	24.9
1973	177	89.1	50.4	3,038	861.4	28.4
1974	145	70.6	48.6	2,692	580.5	21.6
1975	105	37.7	35.9	2,245	396.2	17.7
1976[2]		90.4				
6 Year Average	141	68.0	48.1	2,824	685.8	24.3

1/ Southwest Oregon includes Coos, Curry, Douglas, Jackson and Josephine Counties.

2/ Data for 1976 (Josephine Co.) was provided by the Branch of Forestry, Oregon State Office, Bureau of Land Management.

Source: USDA, Timber Harvest by Ownership in the State of Oregon (1970, 1971, 1972, 1973, and 1974). Forest Survey Project, Pacific Northwest Forest and Range Experiment Station, Forest Service, Portland, Oregon, (July, 1971, August 1972, September 1973, December 1974, January 1976, December 1976).

and 52 percent is urban. The major urban area is Grants Pass, the county seat, which had a 1972 population of 12,875, and a 1977 population of 14,000.

From 1960 to 1970, the county population had a natural increase of 5.8 percent (below the State average) and a increase due to net immigration of 13.7 percent (above State average). A significant portion of immigration to Josephine County consists of retired persons. More than 15 percent of the population is 65 or older, compared with the State average of 10.8 percent. Out-migration of persons is most apparent in the 20-34 age bracket.

In the 1970 census, Josephine County was 97 percent Caucasian. The largest single ethnic minority consisted of 629 Spanish speaking people (1.76 percent). There was a total of 235 Indians, 32 Orientals, 8 Negroes and 71 others. There is minimal racial diversity in the county.

Population Change

Population in Josephine County has been increasing at 4.7 percent per year, a rate exceeding by a factor of 1.5 that for Oregon during 1970-76. Rural population remained constant, while urban population increased during the same period by 46 percent, a trend which is capable of inducing social and economic change at a rapid rate. Josephine County's population has been increasing more rapidly than the United States', Oregon's, or the southwest Oregon counties. Figure 2-28 and Table 2-38 display the data.

Residence Location

Sixty-nine percent of the people in Josephine County live outside of city and town boundaries (Kohl 1976, p. 209). Yet the rural residents are not, by and large, farmers, nor are they employed in the agricultural sector.

Education

According to Schmisseur and Boodt (1975, p. 13), "In the four counties (Curry, Douglas, Josephine and Tillamook) males have significantly less education than the [Oregon] norm." Information provided (Ibid.) indicates the median school completion level for females in Josephine County was 12.1 years; for males it was 11.7 years. These figures compare to a median State level, for all adults, of 12.3 years.

Income and Earnings Trends

Per capita personal income trends are depicted in Figure 2-29. Residents of Josephine County experienced the lowest per capita income levels (76 percent of the U.S. average) among Oregon counties during 1974. Trend of per capita income relative to the United States illustrates that personal income of Josephine County residents has been persistently lower than for most counties of Oregon since 1966. Douglas County experienced per capita incomes of $4,978, 84 percent of the United States average (Figure 2-29 and Table 2-38).

Poverty

The Josephine County 1970 median income was $6,861 for males and $2,689 for females. Mean family income was $8,484. Almost 14 percent

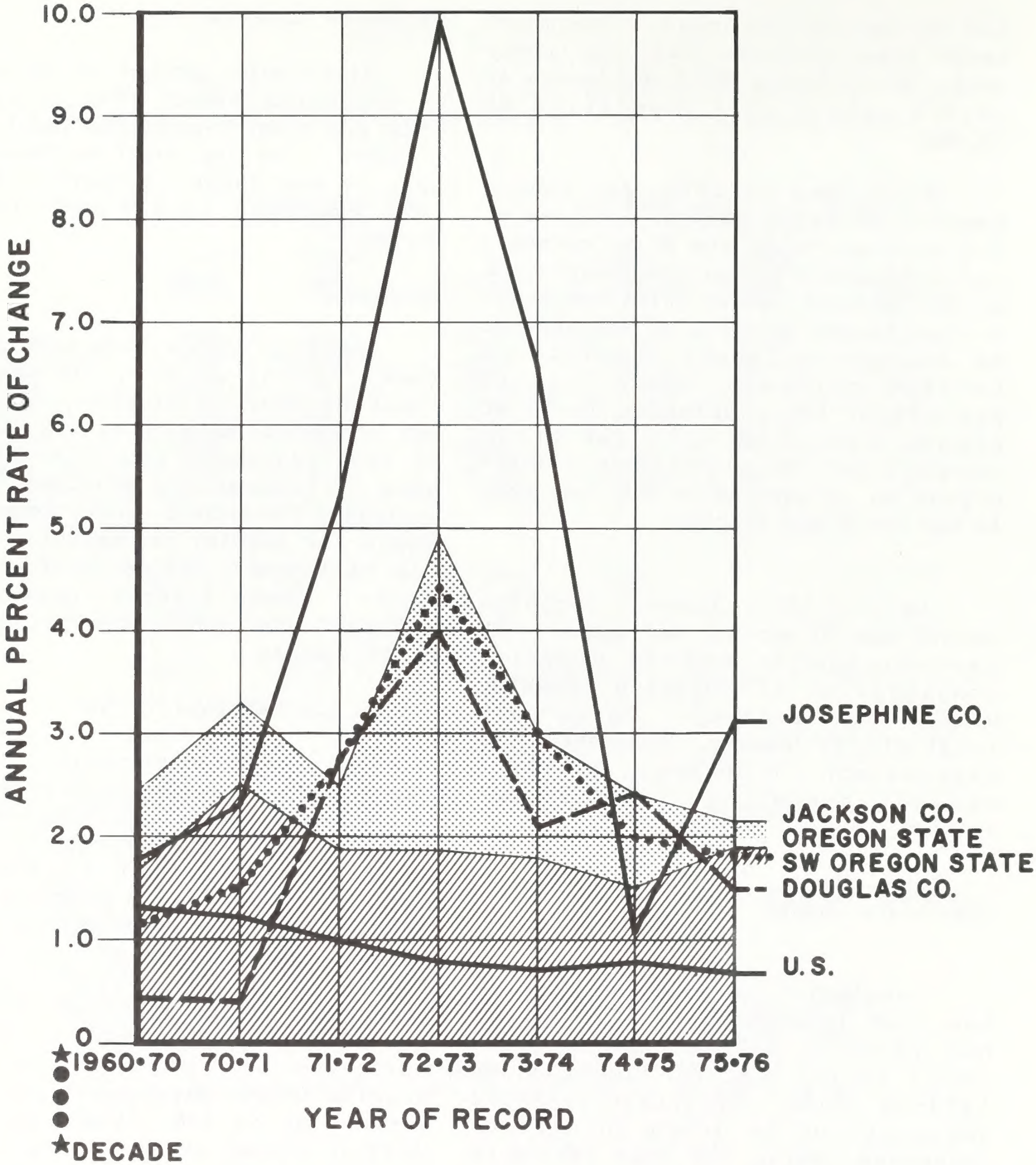


Figure 2-28 ANNUAL RATE OF POPULATION CHANGE

SOURCE: U.S. Data: U.S. Bureau of Census, Current Population Reports, series P•25 (various), 1960 PC(1)•39C, & 1970 PC(1)•C39
State & County Data: Portland State University, Population Research & Census Center, estimates 1971•1976

Table 2-38
Employment, Population and Income, 1974 and Ratio of Labor Force/Employment to Population, 1974 and 1970

JOSEPHINE SYU RELATED COUNTIES AND OREGON

	Oregon	Josephine	Douglas	C.C.D.J.J.*
Total Employment[1/] (1976)	968,000	16,400	32,400	120,380
Population (1976)[2/]	2,341,750	47,000	81,600	316,100
Employment/Population[3/] (1976)	0.41	0.35	0.40	0.38
Income per Capita[5/]	5,752	4,478	4,978	4,890

	Population Trends 1960-1970							1970-1976[2/]		Population Projections[7/]	
	Populations 1960[4/] Number	Populations 1970[6/] Number	Change Ann. Rate	Urban % Total (1970)	Urban % Change (1970)	Rural % Total (1970)	Rural % Change (1970)	1976[2/]	1970-76 Change Annual Rate	Population Projections (1,000's) 1980	1990
Oregon	1,768,675	2,091,385	1.7%	67	+28	33	+3	2,341,750	1.9%	2,496.7	2,835.8
C.C.D.J.J.*	241,276	271,543	1.2%					316,100	2.6%	345.0	393.6
Josephine	29,917	35,746	1.8%	52	+46	48	-0	47,000	4.7%	55.7	66.3
Douglas	68,458	71,743	0.5%	34	+26	66	-4	81,600	2.2%	87.2	98.5

*Southern Oregon Counties, Coos, Curry, Douglas, Jackson and Josephine combined.

1/ Source: Oregon, State of, Oregon Resident Labor Force, Unemployment and Employment 1976 Dept. of Human Resources, Employment Div., Research & Statistics Section, Salem, Oregon, March 1977.

2/ Source: Portland State University, Population Estimates: Oregon Counties and Incorporated Cities, July 1, 1976. Center for Population Research and Census, P.O. Box 751, Portland, Oregon 97207.

3/ Derived from above data: Employment/Population. "Employment" in this case includes all employees.

4/ Source: U.S. Bureau of the Census, U.S. Census of Population: 1960. General Social and Economic Characteristics Oregon. Final Report PC (1) - 39C., U.S.G.P.O., Washington, D.C., 1961.

5/ Source: U.S. Dept. of Commerce, "Oregon Per Capita Personal Income, Counties, in Selected Years 1966-74" Regional Economics Information System, Bureau of Economic Analysis, Washington, D.C. May 1976.

6/ Sources: 1960 Data; U.S. Bureau of the Census, U.S. Census of Population: 1960. General social and Economic Characteristics, Oregon. Final Report PC (1) - 39C., U.S.G.P.O., Washington, D.C. 1961.

1970 Data; U.S. Bureau of the Census, U.S. Census of Population; 1970 Number of Inhabitants, Final Report PC (1) - A39, Oregon U.S.G.P.O. Washington D.C. 1971.

7/ Source: Portland State University, "State of Oregon Population Projections for Oregon and its Counties: 1975-2000" Population Bulletin CPRC Series P-2 #2, Portland, Oregon. February 1976.

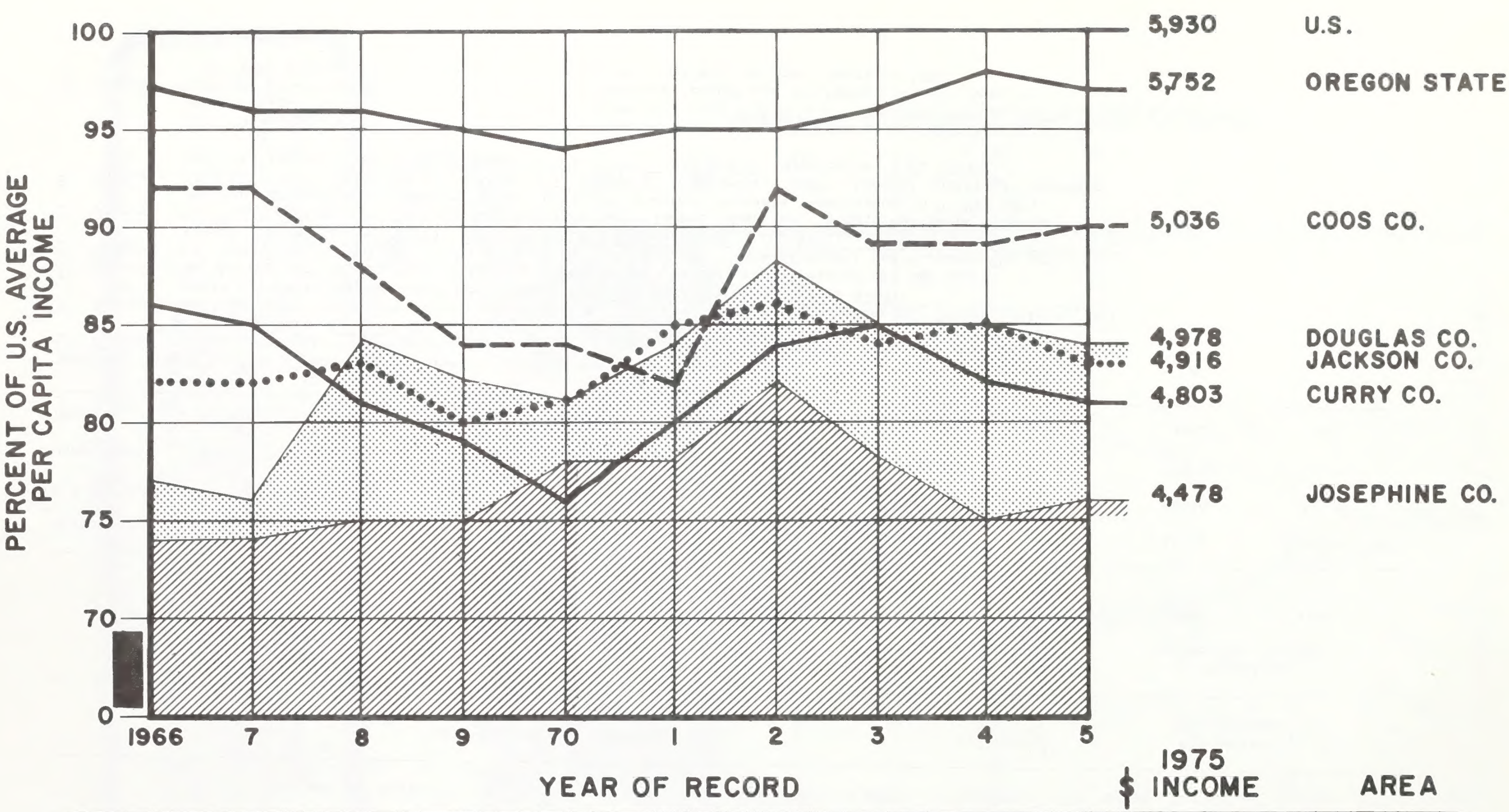


Figure 2-29 PER CAPITA PERSONAL INCOME/COMPARISONS & TRENDS RELATIVE TO U.S. LEVELS 1966•1975

SOURCE: U.S. Department of Commerce, Regional Economics Information System, Bureau of Economic Analysis, Washington, D.C., May 1977

of all families were below the poverty level. The percent of families below the poverty level is almost double the State average of 8.6 percent. Personal income and rate of growth of personal income are also less than the national and Oregon averages (Schmisseur & Boodt 1975, p. 15).

Sources of Income

Personal income includes wages, salaries, property income and transfer payments (such as pensions, Social Security, and unemployment compensation). Most personal income is derived from wages and salaries.

The main single source of income for Josephine County in 1975 was transfer payments, which accounted for 25 percent of that year's total. This amounted to 19 percent during 1970. For Oregon, the comparable proportion was 14 percent in 1975 and 11 percent during 1970. The total income from transfer payments has doubled since 1970 for both Josephine County and the State (USDC, REIS January 1977).

The major single source of earned personal income is manufacturing (29 percent during 1975). During 1970-74, the proportion of manufacturing accounted for by lumber, wood products and paper ranged in Josephine County from 0.75 to 0.83; in Douglas County the ratio was stable at around 0.88. Income from manufacturing in 1974 was about $1.5 million less than in 1973 (Ibid.). The relative significance of income from lumber and wood products manufacturing is only indirectly available by noting that in 1975, for example, 79 percent of all manufacturing employment involved lumber and wood products. The second major source of earned personal income is local, State and Federal government payrolls, third is wholesale and retail trade and fourth is services.

Timber Industry Sources

Direct earnings from lumber and wood products received as wages, salaries, dividends or profit by residents of Josephine County accounted for 12.7 percent of personal income during 1975 (range was 12.7 percent to 17.0 percent during the 1970-75 period, Table 2-41). As a percentage of earnings, the same figure was 21 percent (USDC, REIS January 1977).

Local personal earnings dependent directly and indirectly on the forest products industry accounted for approximately 33 percent of the total earnings and 19 percent of total income in Josephine County. The income generated by BLM timber sales and subsequent processing in local mills represents about 36 percent of that dependent on the timber products industry. Thus, personal earnings derived from BLM-administered timber in JSYU account for 7 percent of the Josephine County income.

Employment: Composition, Stability and Deficiencies

Composition

During 1970, logging and wood products manufacture accounted for 16.4 percent and 26.3 percent of total employment in Josephine and Douglas Counties respectively, but only 8.3 percent for Oregon (Table 2-39). "Covered" employment data for 1970 and 1975 indicate that the percentage of employment in lumber and wood products in the county relative to the statewide average has

Table 2-39

Employment Composition by Sector, 1969

Economic Sector	Oregon	Josephine	Douglas
	% A	% (ratio) B (B/A)	% (ratio) C (C/A)
Agriculture and Food Processing	7.3	6.4 (0.9)	6.5 (0.9)
Mining	0.2	0.2 (1.0)	0.9 (5.1)
Construction	5.8	6.4 (1.1)	5.6 (1.0)
Logging and Wood Products Mfr.	8.3	16.4 (2.0)	26.3 (3.2)
Other Mfr.	11.3	7.6 (0.7)	6.4 (0.6)
Transportation	4.1	2.6 (0.6)	2.5 (0.6)
Utilities	3.1	2.5 (0.8)	2.2 (0.7)
Trade	18.3	18.2 (1.0)	14.8 (0.8)
Services	11.7	10.4 (0.9)	8.2 (0.7)
Tourist Related Trade and Services	7.8	9.1 (1.2)	7.0 (0.9)
Medical and Education and Other Professions	17.3	15.3 (0.9)	15.5 (0.9)
Government	4.9	4.9 (1.0)	4.1 (0.8)

Source: Derived from U.S. Bureau of Census 1972.

remained constant for both counties. Because definitions of "covered employment" and "lumber and wood products" (Standard Industrial Classifications 24 and 26) changed between 1970 and 1975, it is impossible to provide directly comparable data on the percentage of total employment by individual categories.

A longer-term view of Josephine County emloyment is provided by Table 2-40, which indicates a relatively stable level for total employment from 1950 to 1970.

A more comprehensive check on economic structure shifts between 1970 and 1974 comes from the Regional Economics Information System, U.S. Department of Commerce. Personal income originating from lumber and wood products (SIC 24), increased 51 percent and 64 percent (total wage and salary disbursements increased 60 percent in each county) for Josephine and Douglas County respectively (USDC July 29, 1977).

The proportion of wages, salaries and proprietorship earnings from wood products industries relative to total personal income declined moderately in 1974 and 1975 based upon comparisons for 1970 and 1975 (the most recent data). For Josephine County, the proportion was 14.9 percent for 1970 and 12.7 percent during 1975; for Douglas County the proportions were 30.0 percent and 27.1 percent for 1970 and 1975 respectively. Oregon displayed similar stability of total timber-based earnings to total personal income of 9.1 percent and 8.0 percent for 1970 and 1975 respectively. During the intervening years there was a temporary increase in the percentage of total income originating from wood products industries (Table 2-41).

Stability

Data related to employment stability are displayed in Tables 2-42 and 2-43. Table 2-32 indicates that seasonal variation in lumber and wood products employment has increased from a coefficient of variation of 10 percent in 1970 to 17 percent in 1975 for Josephine County. This fact has more meaning, perhaps, when viewed in comparison with the coefficient of variation for all sectors of 8 percent in 1970 and 9 percent in 1975. The coefficient of variation of average annual employment for lumber and wood products sectors from year-to-year was 11 percent for Josephine County for 1970-76. The maximum deviation from average for any year-to-year comparison during the period was 14 percent.

Employment in lumber and wood products exhibited greater seasonal stability in Douglas County than in Josephine County, as was the case for total employment for the years analyzed (1970, 1974 and 1975) (Table 2-42). The coefficient of variation on year-to-year employment averages was 7 percent for the 1970-76 period, which was approximately the same as the seasonal variability measure. Whether the timber industry in the JSYU is a stabilizing or destabilizing factor cannot be concluded in general. It appears that for Josephine County, the timber industry contributes instability, whereas for Douglas County, stability is improved by timber industry employment.

Table 2-37 shows year-to-year shifts in the amount of timber harvested from previous BLM sales in Josephine County ranging as high as 63 MM bd. ft. from 1971 to 1972 and 53 MM bd. ft. from 1975 to 1976. The most severe long-term decline over

Table 2-40

Employment by Economic Sector, Josephine County, 1940 to 1970

Industry	Employment in 1940	1950	1960	1970
Agriculture, forestry, & fisheries. . .	1,686	1,700	974	598
Mining.	473	113	44	20
Contract construction	264	592	671	695
Manufacturing	533	2,623	2,708	2,693
Food & kindred products.	86	97	101	93
Textile & apparel products	2	6	4	50
Lumber, wood products, furniture . .	358	2,381	2,323	1,776
Printing and publishing.	49	76	120	135
Chemical and allied products	4	2	0	4
Electrical and other machinery . . .	5	18	61	99
Transportation equipment	4	5	38	317
Other & miscellaneous manufacturing.	25	38	61	219
Railroads and rail express.	51	73	52	50
Trucking and warehousing.	50	87	155	130
Other transportation.	19	42	69	102
Communications.	25	55	83	149
Utilities and sanitary service.	52	174	166	118
Wholesale trade	65	233	228	310
Food and dairy product stores	143	260	308	317
Eating and drinking places.	157	318	371	436
Other retail trade.	458	897	955	1,350
Finance, insurance, real estate	89	217	328	433
Hotels and other personal services. . .	263	361	414	433
Private households.	165	200	307	119
Business and repair services.	148	320	264	320
Entertainment, recreation services. . .	39	69	51	118
Medical, other professional services. .	356	673	1,041	1,922
Public administration	148	233	274	536
Total.	5,184	9,240	9,463	10,849
Unemployment . .	1/	631	1,096	1,169

1/ Not available

Source: U.S. Department of Commerce, Census of Population.

Table 2-41

Earnings by Timber Industry Source, as a Percent of Total Personal Income of Residents, Josephine Co., Douglas Co., and Oregon 1970-1975

Josephine Company	Lumber and Wood Prod. Percent	Paper & Allied Products Percent	Total Wood Percent
Year			
1970	14.9	w[1/]	w
1971	15.7	w	w
1972	17.0	w	w
1973	16.0	w	w
1974	13.3	w	w
1975	12.7	w	w
Douglas Company			
Year			
1970	30.0	w	w
1971	32.1	w	w
1972	33.0	w	w
1973	32.3	w	w
1974	30.0	w	w
1975	27.1	w	w
Oregon			
Year			
1970	7.8	1.3	9.1
1971	8.1	1.2	9.4
1972	8.6	1.2	9.8
1973	8.4	1.1	9.6
1974	7.5	1.2	8.7
1975	6.9	1.2	8.0

1/ w - Indicates that data are withheld to avoid possible disclosure of confidential information regarding a single firm.

Source: Derived from USDC, Regional Economics Information System (Special request July 29, 1977), Table 8.03

Table 2-42

Unemployment Rates, Employment in Lumber and Wood Products for Josephine Co., Douglas Co. and Oregon, 1970-1976

Year	Unemployment Rate	Employment in Lumber and Wood Products[1/]	Unemployment Rate	Employment in Lumber and Wood Products[1/]	Unemployment Rate	Employment in Lumber and Wood Products[1/]
1970	10.3	1,840	9.0	7,495	7.1	66,766
1971	10.2	2,090	8.4	8,320	7.6	70,400
1972	9.0	2,360	7.2	8,970	6.8	75,415
1973	9.1	2,360	7.4	9,150	6.2	79,100
1974	12.2	2,140	9.4	8,980	7.5	75,000
1975	15.7	1,890	12.7	8,280	10.6	67,800
1976	13.6	2,450	10.3	8,870	9.5	73,800

1/ These data do not include mobile home manufacturing, which was included in regular Employment Division reports for years 1975 and 1976.

Source: Lynch 1977

Table 2-43

Major Employers in the Grants Pass, Roseburg, and Medford Area, with Approximate Employment and Major Product, 1974

AREA	NAME OF FIRM	EMPLOYEES[1/]	PRINCIPAL PRODUCT
Grants Pass	Southern Oregon Plywood	180	Plywood
	Bate Plywood Co., Inc.	220	Plywood
	The Robert Dollar Company	180	Plywood & Lumber
	Glendale Plywood	150	Plywood
	SWF Plywood Company	200	Plywood
	Sierra Wood Products	50	Plywood
	Agnew Plywood	200	Plywood
	Carolina Pacific Plywood	200	Plywood
	Tim Ply Company	150	Plywood
	SH&W Lumber Company	130	Lumber
	Spalding & Son, Inc.	150	Lumber
	Diamond Industries	125	Pre-fab Cabinets
	Champion Products	85	Athletic Knitwear
Roseburg	Roseburg Lumber Company	4,000	Wood Products
	UARCO, INC.	135	Business Forms
	Douglas County Lumber Co.	350	Wood Products
	Keller Lumber Co.	75	Wood Products
	U.S. Plywood	250	Wood Products
Medford	Boise Cascade Corporation	470	Veneer & Plywood
	Bear Creek Corporation	600	Gift & Canned fruits
	Medford Corporation	600	Sawmill - Veneer & Plywood
	3M Company	250	Packaging Materials
	Cascade Wood Products	350	Millwork
	Standard Transformer	95	Transformers
	Superior Plastics	100	Boat Building
	Reichhold Chemicals, Inc.	26	Industrial Chemicals
	Medford Steel	95	Sheet Metal
	Kadee Metal Products	10	Special tools & dies
	Northwest Printed Circuits	30	Electronic components

[1/] Employment figures are approximate because Employment Division information regarding three firms or fewer is confidential.

Source: Oregon, State of, An Oregon Community Profile (individual sheets for Grants Pass, Roseburg and Medford), Dept. of Economic Development, 1975.

several years was 76 MM bd. ft. from 1972 to 1975. These variations illustrate the sharp swings in harvest level that result from fluctuations in the timber products market. These extreme cyclical shifts far exceed the decrease expected to result from the proposed action.

Major Employers

In Josephine County, during 1974, the largest private employers in the 180 to 220 employee category were six plywood mills. Jackson County was more diversified, however, with two plywood firms that cumulatively employed 1,070 employees, which is about as many employees as are employed by the six largest firms in Josephine County. Although Douglas County businesses are also primarily in lumber and wood products, one firm employed 4,000 employees. This displays for Douglas County much less diversity in ownership and industrial structure than either Jackson or Josephine County (Table 2-43).

Unemployment

Since 1969, the average unemployment rate in Josephine County has exceeded the statewide rate by 3.5 points. In recent years Josephine County has frequently experienced the highest unemployment rate among all Oregon counties (13.6 percent during 1976). In 1975, of the 18,311 in the Josephine County labor force (Lynch 1977), only 15,515 persons, or 85 percent, were employed. Unemployment rates during 1975 averaged 15.7 percent for the year and fluctuated from a high of more than 21 percent during the first quarter of 1975 to a low of about 12 percent in the third quarter of the year. The Douglas County unemployment rate exceeded the Oregon rate, on the average by 1.3 points for 1970-76.

Income and Employment Effects of Logging and Processing

Personal Income

Lumber and wood products accounted for 12.7 to 17 percent of direct income received by Josephine County residents in 1970-75. In Douglas County, the figure ranged from 27.1 to 33 percent. For the State as a whole, the percentage of direct wage, salary and proprietorship income from lumber and wood products (SIC 24) ranged from a low of 6.9 to a high of 8.6 during the same period (see Table 2-41).

Because lumber and wood products form a major part of the export base for Josephine and Douglas Counties, the direct income generated is only part of the local income dependent on timber harvest and processing. Douglas County export-based income was estimated to be 68.7 percent dependent upon exports by the forest-oriented sectors (including BLM and USFS) during 1970 (Darr 1974, page 14). An alternative estimation procedure which includes the entire local economy indicated that 42 percent of Douglas County personal income during 1970 was dependent on lumber and wood products. The alternative is based on SIC 24, which is not as broadly defined (i.e., does not treat BLM and USFS activities as export base sectors) as the 68.7 percent estimate and focuses upon all sectors of the local economy (BLM 1973, p. 42). Based on the latter procedure, 24 percent of Josephine County's direct personal earnings were generated within the lumber and wood products sector (Ibid, p. 43).

Employment Related to Harvest and Processing

The most recent data available indicate that the employment requirements per unit timber logged or processed by sawmills or veneer and plywood mills are not dramatically different between Josephine County and southwest Oregon counties or western Oregon (Table 2-44). Douglas County, however, appears to have experienced uniformly lower labor input per unit processed. Based on the data presented in Appendix K, a composite employment impact per million board feet locally processed was 7.35 during 1968-73 and is projected to be 6.55 during the 1975-85 period.

Income Related to Employment

Josephine County processes more timber than is harvested within the county, whereas the opposite is true for Douglas County. This asymmetry makes it impractical to utilize the analysis of the Douglas County economy directly in developing estimates for Josephine. In the absence of this comprehensive tool, ratios of direct income to quantity of stumpage processed during 1972 were adjusted to 1974 and utilized. The most recent data on quantity processed by county are for 1972 (Schuldt 1974, Table 4). Timber harvest by ownership for 1974 and 1975 is presented in Table 2-45. The estimates are updated to 1974 to provide comparability with other analyses in the Josephine SYU, Planning Area Analysis. An additional note is in order regarding attempts to reliably understand timber harvest impact upon the dependent economy. Some activities included in SIC 24, "Lumber & Wood Products", are resource-dependent, i.e., directly influenced by the level of timber harvest (for example, logging camps and logging contractors, sawmills and veneer and plywood mills). Others such as wood kitchen cabinet manufacture, millwork, wood moldings and mobile home manufacture, once established, will respond in level of output to demand factors almost exclusively, as contrasted with timber harvest, or supply forces. The data available include both types of activities and therefore overstate the likely income impacts of changes in level of timber harvest.

For Glendale, the reported timber processing capacity in 1974 was about 122 MM bd. ft. (Directory of the Forest Products Industry 1976) (Table 2-46).

Income/Quantity Processed

During 1972, direct personal income per thousand board feet processed was \$93, \$102 and \$83 in the Oregon Fir Region (excluding Hood River County), Josephine County and Douglas County respectively, as derived from Schuldt (December 1974, Table 4) and USDC, REIS February 1977. Based on income multipliers (BLM 1978) of 1.93 for Josephine and 1.54 for Douglas, the total income per thousand board feet processed would be \$197 for Josephine County and \$127 for Douglas County. Updated to 1974, using harvest/process ratios existing in 1972, the direct personal income per thousand board feet processed in 1974 was \$135 in Josephine and \$114 for Douglas County. The total (direct plus indirect) personal income per thousand board feet processed is estimated at \$260 for Josephine and \$175 for Douglas County. These ratios overestimate the income effect of changes in harvest due to inclusion of wood

Table 2-44

Employment - Timber Processed Relationships for Southern Oregon Counties, 1972
Forest Products Employment by County in 1972

Resource Area and Counties	Logging SLC 2411	Sawmills SIC 2421	Veneer and Plywood SIC 2432	All Other SIC 24	Lumber and Wood Products SIC 24	Paper and Allied Products SIC 24
	Number of Employees					
Southwest						
Coos	1,129	1,870	2,023	220	5,242	170
Curry	271	207	952	64	1,434	0
Douglas	1,885	2,188	3,915	998	8,986	335 1/
Jackson	748	1,174	2/	1,174	2/	180
Josephine	348	701	3,722 2/	97	7,962 2/	1/
Total	4,379	6,140	10,612	2,553	23,684	685
Western Oregon	10,570	17,422	25,414	8,569	61,975	6,234

Employment-Wood Consumption Relationships, 1972

Resource Area and Counties	Logging SIC 2411	Sawmill and Planning Mills SIC 2421	Veneer and Plywood SIC 2432
	Employees per Million Board Feet		
	(Harvested)	(Processed)	(Processed)
Southwest			
Coos	1.757	4.301	6.803
Curry	0.965	2.176	8.832
Douglas	1.194	3.457	6.923
Jackson	1.334	4.165	3/
Josephine	1.780	3.859	7.531 3/
Total	1.344	2.766	7.245
Western Oregon	1.413	3.843	7.849

1/ Douglas and Josephine have been combined to avoid disclosure.
2/ Jackson and Josephine have been combined to avoid disclosure.
3/ Jackson and Josephine have been combined to avoid disclosure.

Source: Wall, Brian, Employment/Wood Consumption Relationships, 1972, an unpublished report, USDA Forest Service, Pac. Northwest For. and Range Exp. Stn. Portland, Oreg. July 1977.

Table 2-45

Timber Harvest by Ownership
Josephine County and Douglas County, 1974 and 1975

Land Ownership	Josephine County MBF	Josephine County Percent	Douglas County MBF	Douglas County Percent
1974				
Private	12,972	8.9	648,328	48.8
State	2,710	1.9	29,013	2.2
BLM	70,566	48.6	287,569	21.6
USFS	55,880	38.5	364,134	27.4
Other Public	3,071	2.1	446	-
TOTAL	145,199		1,329,490	100.0
1975				
Private	10,492	10.0	663,936	57.1
State	1,269	1.2	13,281	1.1
BLM	37,682	35.8	178,311	15.3
USFS	51,474	49.0	304,125	26.2
Other Public	4,165	4.0	2,587	0.2
TOTAL	105,082		1,162,240	

Source: USDA Forest Service, 1974 (1975), Oregon Timber Harvest, Resource Bulletin PNW-63(69), January 1976 (December 1976).

Table 2-46

Production and Capacity of Glendale Area Mills

	Production 1974	Annual Capacity 1/
Robert Dollar Company		
Sawmill	48 MMBF	64 MMBF
Softwood Veneer	48 MMBF 2/ 3/	64 MMBF
Superior Lumber Co.		
Sawmill	26 MMBF	48 MMBF

1/ Assuming 365 day/year operation.
2/ Converted from 1/8" surface square feet to Scribner log scale.
3/ Based upon "capacity" in the absence of production information.

Source: Directory of the Forest Products Industry 1976.

products manufacture directly dependent on local timber harvest.

Table 2-42 shows the relationship between total volume harvested and total volume processed by the lumber and wood products industry in Josephine County. It also shows the percentage of the volumes which originated on BLM-administered lands.

The amount of direct and indirect personal income attributed to logging and processing of timber from BLM-administered lands in the JSYU was estimated to be $27.6 million for all destinations (Table 2-47). The amount for Josephine County was estimated to be $16.2 million.

Public Revenues

The formula for distribution of O&C receipts is based on the total receipts of timber sales from all O&C lands in western Oregon. From fiscal year 1973 to 1976, an average 10 percent of the funds distributed to counties from the O&C receipts was derived from O&C lands under USFS management (BLM, Public Land Statistics, 1973, 1974, 1975 and 1976 FY, Table 116). Receipts of each county government are based on fixed proportions of the O&C counties' fund. For southwest Oregon counties the percentage shares in the distribution (BLM 1964) are: Coos, 5.9; Curry, 3.65; Douglas, 25.05; Jackson, 15.67; and Josephine, 12.08. Individual county receipts, therefore, vary with timber receipts for all O&C lands rather than with timber harvest (or stumpage prices) within the individual county. Public lands in the JSYU account for approximately 7 percent of total O&C receipts.

For all O&C counties combined, the O&C disbursements to counties were equivalent to a levy based on all taxable property at a rate of $3.02 during 1977. The comparable tax rate statistic representative of the southwest Oregon counties as a group was $7.63 during 1976, and $12.07 during 1977. For individual southwest Oregon counties the comparable equivalency, during 1976 and 1977, was: Coos, $4.14 and $6.59; Curry, $8.41 and $13.27; Douglas, $9.04 and $14.47; Jackson, $6.18 and $9.78; and for Josephine, $12.00 and $18.23. Table 2-48 contains details on "tax rate equivalence" and "percent supplement to levy" for each O&C county for 1976 and 1977. The "percent supplement to levy" was calculated by dividing the O&C payment by the appropriate property tax levy. For the Josephine and Curry county areas, such payments in 1977 exceeded the combined tax levy. From 1976 to 1977 the proportion of the two sources of revenue combined accounted for by O&C payments nearly doubled. The average tax rate equivalency of O&C payments for the years 1973-74-75 was moderately higher than during 1976 for most counties.

During 1977, the O&C receipts were equivalent to 13.6 percent of tax base for the combined O&C counties, and 60.4 percent for the combined southwest Oregon counties (31 percent for Coos, 120 percent for Curry, 90 percent for Douglas, 51 percent for Jackson, and 119 percent for Josephine).

The O&C payments to counties increased by 80 percent from 1976 to 1977; however assessments of taxable property increased by 27 percent during the same period, and combined

Table 2-47

Relationship of JSYU Timber Harvest under Current Management to Selected Economic Variables in Destination Counties, 1973 to 1975 and Projected to 1980

	Units	Average Annual 1973-4-5	Projected 1980
Timber Supply Annual Harvest (JSYU)	(MMBF)	126	146
Direct Employment[1/]	(Jobs)		
Merlin	"	239	258
Grants Pass	"	230	249
Josephine County	"	469	507
Glendale	"	327	354
Roseburg	"	18	19
Douglas County	"	345	373
Medford	"	71	77
Jackson County	"	71	77
Total Local	"	885	957
Non-Local[2/]	"	101	93
Total Employment[3/]			
Josephine County	"	938	1,014
Douglas County	"	539	583
Jackson County	"	131	142
Total Local	"	1,608	1,739
Non-Local	"	184	169
Dependent Population (persons)[4/]			
Josephine County	"	2,700	2,900
Douglas County	"	1,400	1,700
Jackson County	"	340	410
Total Local	"	4,440	5,000
Non-Local	"	530	490
Total Personal Income (1974)[5/]			
Josephine County	($1,000,000)	16.2	n.e.[6/]
Douglas County	"	9.3	n.e.
Jackson County	"	2.1	n.e.
Non-Local	"	n.e.	n.e.
Public Finance (O&C Payments-JSYU)			
JSYU Dependent O&C Payments	($1,000,000)[7/]		
O&C Counties	"	4.85	12.2
S.W. Oregon	"	3.02	7.6
Josephine County	"	0.59	1.5
Douglas County	"	1.22	3.1
Jackson County	"	0.76	1.9
Tax Rate Equivalence[8/]	$/$1,000		
O&C County Area	"	0.20	0.34
S.W. Oregon	"	0.78	1.39
Josephine Area	"	1.25	2.10
Douglas Area	"	0.90	1.66
Jackson Area	"	0.65	1.12

1/ Includes employment in loging, sawmills and veneer and plywood mills.
2/ Non-local employment is based on processing of coarse wood residue from local mills resulting from processing of timber from the JSYU. Processing locations are outside the Jackson-Josephine County area.
3/ Based on secondary employment in activities supporting logging and primary processing.
4/ Population is estimated based upon the aggregate employment/population ratio: 0.35.
5/ For basis, refer to narrative presented in this section.
6/ The letters (n.e.) represent data that was not estimated because of inadequate basis.
7/ O&C payments to counties are based upon estimated stumpage prices of $77/MMBF for Medford District timber harvested in 1973-4-5 and projected price of $167/MMBF for timber harvested during 1979-80-81. Average price for timber sold in Western Oregon during FY 1977 was $171/MMBF.
8/ For an explanation of tax rate equivalence, see the following Table 2-56.

Table 2-48

O&C Revenue Disbursements Expressed as Property Tax Rate Equivalence and Percent Supplement to Property Tax Levy, O&C Counties, 1976 and 1977

	Tax Rate Equivalence[1/]		Percent Supplement to Levy[2/]	
	1976	1977	1976	1977
	(Dollars per $1,000 Assessed Value)			
Benton	$2.31	$3.36	9.1%	21.9%
Clackamas	1.07	1.69	4.0	6.8
Columbia	1.38	2.20	8.9	15.2
Coos	4.14	6.59	16.0	30.9
Curry	8.41	13.27	44.8	120.2
Douglas	9 04	14.47	57.6	90.0
Jackson	6.18	9.78	28.2	50.5
Josephine	12.01	18.23	60.6	119.1
SW Oregon	7.63	12.07	38.0	68.4
Klamath	1.56	2.47	10.5	17.3
Lane	2.53	3.92	10.2	17.1
Lincoln	0.31	0.45	1.8	3.4
Linn	1.13	1.77	5.2	9.4
Marion	0.41	0.62	1.5	2.6
Multnomah	0.08	0.13	0.3	0.5
Polk	2.55	3.91	9.9	16.2
Tillamook	0.94	1.38	5.0	8.2
Washington	0.12	0.19	0.5	0.8
Yamhill	0.69	1.09	2.8	4.9
All O&C Counties	$2.16	$3.01	7.9	13.6

1/ Calculated as follows: O&C payment tax rate equivalency = O&C payment divided by total true cash value of property (thousands of dollars) --Total true cash value estimates are from: Oregon Department of Revenue 1977c; Oregon Department of Revenue 1977b.

2/ Calculated as follows: Percent supplement to levy = O&C payment divided by levy of all taxing units within and including the county. Levy estimates are based on Oregon Department of Revenue, Telephone inquiry of Mr. Dick Yates November 4, 1977 (for 77/78 levy), and the second reference in footnote 1 for the 76/77 levy.

Note: O&C payment for FY 1976 are based on receipts from 7/1/75 to 6/30/76; for FY 1977 the payments are based on receipts from 10/176 to 9/30/77.

tax levies increased by 16 percent for all O&C counties.

In a number of counties, O&C receipts are a highly visible source of county government revenue. In Josephine County, such receipts make property taxes unneccessary for support of county administration. Schools, municipal and other local government functions, however, do levy a property tax. Table 2-49 displays sources and uses of county revenue by broad classes for Douglas and Josephine county government functions.

The data in Table 2-49 do not adequately represent all interested parties. Other local government units within each county will find passage of tax issues more or less difficult depending upon the rate required for the proposed combined tax. Where counties receive a significant portion of their revenues from the O&C fund, it is possible to maintain a given level of services with a lower levy. In addition, where county government budgets are relatively rich in non-tax sources of revenue, services and improvements normally provided by town, city, schools, or special districts become county-supported functions. (The Douglas County government provided $2,000,000 for support of schools during 1976 and has committed to the same level during 1978.)

Social Values and Attitudes

Impact Population

The focus of concern in this section is on those persons in the Josephine Sustained Yield Unit who would comprise the "impact population" if the proposed action were taken. The attitudes and values of tourists, travelers and non-local environmental organizations will not be discussed.

The impact population is composed heavily of rural, non-farm residents. Unemployment is very high, annual earnings are significantly low, and school completion levels are below the State median. There is a relatively strong dependence on welfare assistance and a high proportion of aged persons.

The divorce rate exceeds the average for the State (7.4 per 1,000, compared with 6.8). Funds for public assistance (supplementary security income, old age assistance, general assistance, and food stamp programs) exceed statewide average expenditures (Kohl 1976). There is a higher proportion of persons age 65 and older in the county (15 percent) than there is in the State as a whole (11 percent), however, the proportion of such persons with incomes below the poverty level is approximately the same (24 percent).

County residents hold diverse opinions on not only present socioeconomic conditions but also future plans. Attitudes range from supporting a "no change - no growth" position to emphasizing an "aggressive plan" to attract new industries and businesses (Lowenberg 1975, p. 61-85).

In a certain sense, such a diversity in attitudes, even in an economically depressed area, is not surprising. Those who earn incomes higher than average, and who can and/or do appreciate living in a region with a low population density, can argue easily for no change or no growth. On the other hand, those who want to work but cannot find jobs and those whose assets would be increased by new business could be expected to

Table 2-49

Summary of Josephine and Douglas County Revenues and Expenditures for Fiscal Year 1975-76

Item	Josephine Co. 1/ Amount	Josephine Co. 1/ Percent	Douglas Co. 2/ Amount	Douglas Co. 2/ Percent
Revenues				
O&C Payments 3/	$5,961,234	56.1%	$12,361,664	47.6%
County Property Taxes	---------	0.0%	1,352,742	5.0%
All Other Revenues	4,666,250	43.9%	12,329,771 4/	47.4%
Total Revenues	$10,627,483	100.0	$26,044,177	100.0
Expenditures				
General Fund	6,468,800	61.3%	10,727,261	36.0%
Road Fund	2,386,096	22.6%	8,383,224	28.0%
Other Funds	1,698,020	16.6%	10,679,327	36.0%
Total Expenditures	10,552,916	100.0	29,789,812	100.0

1/ Source: Office of the Josephine County Commission
2/ Source: Douglas County Budget Director
3/ Based on 1975 FY O&C payments, included in county revenues during FY 1976
4/ Does not include carry-over surplus of 13,691,358

support efforts to maintain existing or attract increased employment.

A broad range of opinions was voiced at public meetings in the JSYU. Some favored increased cutting, others supported an immediate cessation of cutting. Some supported a continuation of present practices, others wanted thorough revisions. The increased cut viewpoint was held by people of entirely different age and employment backgrounds. Some were motivated to this viewpoint by concern over the increase of taxes, others wanted to speed the end of timber industry domination in order to stabilize the economy (compare Lowenberg 1975, p. 37).

Employees of the Lumber & Wood Products Industry

A description of the statewide labor force probably applies to the labor force in the timbershed of the JSYU. Descriptive results from the study by Stevens (April 1976) present the lumber and wood products employees as follows.

"In marked contrast to the Census report that there are about 68,000 wood products workers in Oregon, the state-wide study finds that there are actually about 110,000 workers. This results from taking a more comprehensive view of a wood product worker,--that is, anyone who received wages during the 1972 calendar year.

"Average monthly employment in wood products in 1972 was about 75,200 jobs; thus, there are about three workers for every two jobs. These jobs are shared, rather unequally, between a core labor force of about 60,000 to 65,000 non-mobile workers and a peripheral labor force of about 40,000 to 45,000 mobile workers.

"The core labor force (60,000 to 65,000 workers) is relatively homogeneous and easy to describe. In general, these workers are white male, in their early forties, have an eleventh grade education, are married, and live in small towns. They have worked a dozen years or more in wood products. Mill workers have probably worked at their current job for the past six years; loggers change employers more frequently. The median income of the core labor force is about $12,000 per year, almost all of which is derived from labor earnings. Unemployment rates are minimal within the core labor force, especially for mill workers. Even loggers, subjected to more weather problems, draw far less unemployment compensation (perhaps two weeks, on the average) than is attributed to the false stereotype who 'sits all winter.'

"The peripheral labor force (40,000 to 45,000 workers) is a more heterogenous group, especially in terms of their labor force participation. One significant sub-group is that of seasonal student workers, about 14,000 in number. This group is in the labor market for only part of the year, earns a modest income ($2,250 median), and has had a low historical unemployment rate (3.0 percent). The remainder of the mobile category, about 30,000 workers total, are largely committed to the labor market on a year-around basis. They are predominantly young (31 years old, on the average) and have typically spent more time in non-wood products jobs than in wood products jobs. They have changed jobs frequently, averaging only 1.5 years at each job. The key characteristic of this group is that they are successfully adaptive, at least to this point in time. While their historical unemployment rate is slightly higher than the statewide-average (10 versus 7 percent), their median labor earnings ($7,875 in 1972) are roughly the same as for all semi-skilled workers on a state-wide basis."

2.1.4 Existing Land Use

The total area of the Josephine SYU is 856,844 acres, of which 425,720 acres or 49.7 percent are public lands (an exact breakdown of land jurisdiction appears in Table 1-2). The following discussion of land use deals primarily with uses on BLM-administered lands.

2.1.4.1 Timber Management

Timber management is the dominant use of public land in JSYU. The present allowable cut provides for the harvest of 146 million board feet (Scribner) per year. The commercial forest land base upon which that level of cut was determined amounted to 334,500 acres.

Elements of existing timber management include annual sales, road construction, harvest of trees by clearcut and three-stage shelterwood methods as well as salvage, slash disposal, reforestation, site preparation and thinning. Table 2-50 provides a breakdown by year and acreage of timber management practices.

Annual Timber Sales

The current timber management plan was implemented beginning in fiscal year 1972 (July 1, 1971) and is based on the principles of sustained yield and environmental quality. Annual timber sale plans of the Medford District contain site specific information on individual proposed timber sales. Information listed in an annual plan includes the location of the proposed sale, approximate volume to be harvested, cutting practices to be followed, method of logging, road construction and access requirements, special contractual provisions and other relevant data. Table 2-51 summarizes data on timber sales in JSYU under the current allowable cut plan.

Forest Development

The present allowable cut plan recognizes a necessity for prompt regeneration of areas receiving final harvest cut. Annual programs for artificial regeneration, stand improvement, and site conversion are among the silvicultural practices employed to achieve full productivity from commercial forest lands. Table 2-50 shows the acreage by practice which has been treated during the present allowable cut plan period.

Disruptive Factors

The timber management program in the Josephine SYU is influenced and can be altered by certain natural or human-caused phenomena. An annual timber sale plan is designed with the normal situation in mind. Occasionally, insect populations may grow to epidemic proportions or a single catastrophic event, such as a fire or windstorm of major proportions, may occur. When this happens changes in the timber harvest plan may result. Changes could take on the form of 1) selection of different methods of harvesting timber, 2) accelerating the annual cut over a period of time, 3) altering the locations of timber harvest and/or marketing areas, or 4) creating the necessity for unusual rehabilitation programs in the area. Three categories of events that can disrupt normal situation planning are discussed previously: Section 2.1.2.1 Tree diseases, Section 2.1.2.2 Forest Insects and Section 2.1.1.5 Wildfire Occurrence.

Trespass, the unauthorized cutting and/or removal of forest products, i.e., timber, Christmas trees, cedar shake bolts or posts, and firewood, occurs with varying degrees of regularity throughout the Josephine SYU. Trespass may be willful or inadvertent. As the value of these products (especially high-quality cedar) increases, the incidence of willful trespass also

Table 2-50
Management Practices

Treatments	FY 72	FY 73	FY 74	FY 75	FY 76 1/	FY 77	FY 78 2/
Transportation System							
Miles of permanent road constructed	120	122	101	75	102	96	76
Miles of existing road reconstructed	83	108	95	92	88	45	60
Shelterwood Harvest							
Initial Cut	9,345	10,280	4,533	8,957	14,945	5,226	0
Regeneration Cut	0	0	0	0	0	5,330	6,813
Final Harvest Cut	0	0	0	0	0	0	0
Clearcut	848	1,019	650	677	965	785	1,556
Slash Disposal							
Burning	0	0	0	0	0	0	500
Gross Yarding (including machine piling)	0	0	0	300	500	1,000	2,000
Site Preparation							
Herbicide	0	0	0	0	0	180	180
Mechanical Scarification	0	0	116	0	15	130	150
Planting							
Replant and Interplant (existing non-stocked or understocked clearcuts)	1,948	1,226	1,220	787	681	1,720	1,500
Initial Planting (new clearcut & shelterwood regeneration cut areas)	0	0	0	0	0	0	1,000
Replant & interplant (new cutting areas not adequately stocked by initial planting. Includes areas receiving overstory removal)	0	0	0	0	0	0	0
Herbicide Release	0	0	0	0	0	423	239
Precommercial Thinning	23	0	59	9	9	300	300
Fertilization	0	0	0	0	0	0	0
Commercial Thinning	0	0	0	0	0	300	300

1/ Fifteen month fiscal year
2/ Planned for fiscal year

Source: Medford District, BLM, 1977.

Table 2-51

Timber Sales: Josephine SYU

Fiscal Year	Volume (MBF)	Acres Involved Clear Cut	Partial Cut
1972	146,151	848	9,345
1973	154,579	1,019	10,280
1974	140,715	650	9,533
1975	143,126	677	8,957
1976	174,996	965	14,945
1977 1/	144,604	785	10,656
1978 2/	146,000	1,556	6,813

1/ 15 month fiscal year

2/ Planned for fiscal year, no breakdown of cutting practices

Sources: BLM Monthly Timber Sale Summaries

increases. The tremendous increase in the demand for firewood has led to the loss of high-quality timber by persons unaware of its value.

2.1.4.2 Agriculture and Grazing

Agriculture

Some 70 percent of the Josephine Sustained Yield Unit lies within Josephine County. Land use does not differ sharply in the adjacent counties which make up the balance of the SYU. The approximately 38,500 acres devoted to agriculture in Josephine County provide the base to estimate 55,000 acres of private land devoted to agricultural purposes in the entire SYU. No public lands are used for authorized agricultural purposes in the SYU.

Private agriculture consists mostly of small beef and dairy farms on the flood plains and adjacent low hills of the Rogue River west of Grants Pass, the Applegate River and Williams Creek Valley south of Grants Pass, Cow Creek east and west of Glendale, and in the Upper Illinois River Valley south and east of Cave Junction. Many small single-family subsistence farms are scattered throughout the SYU. Farmlands comprise a mixture of high value irrigated cropland, irrigated hay fields, and non-irrigated grazing pasture. The general agricultural areas are depicted on Figure 2-30.

Grazing on Public Lands

Livestock grazing on BLM-administered lands in the Josephine Sustained Yield Unit is authorized by Section 15 of the Taylor Grazing Act of June 28, 1934. Grazing leases specifically on revested Oregon and California Railroad lands are authorized by Section 4 of the Act of August 28, 1937, but only when

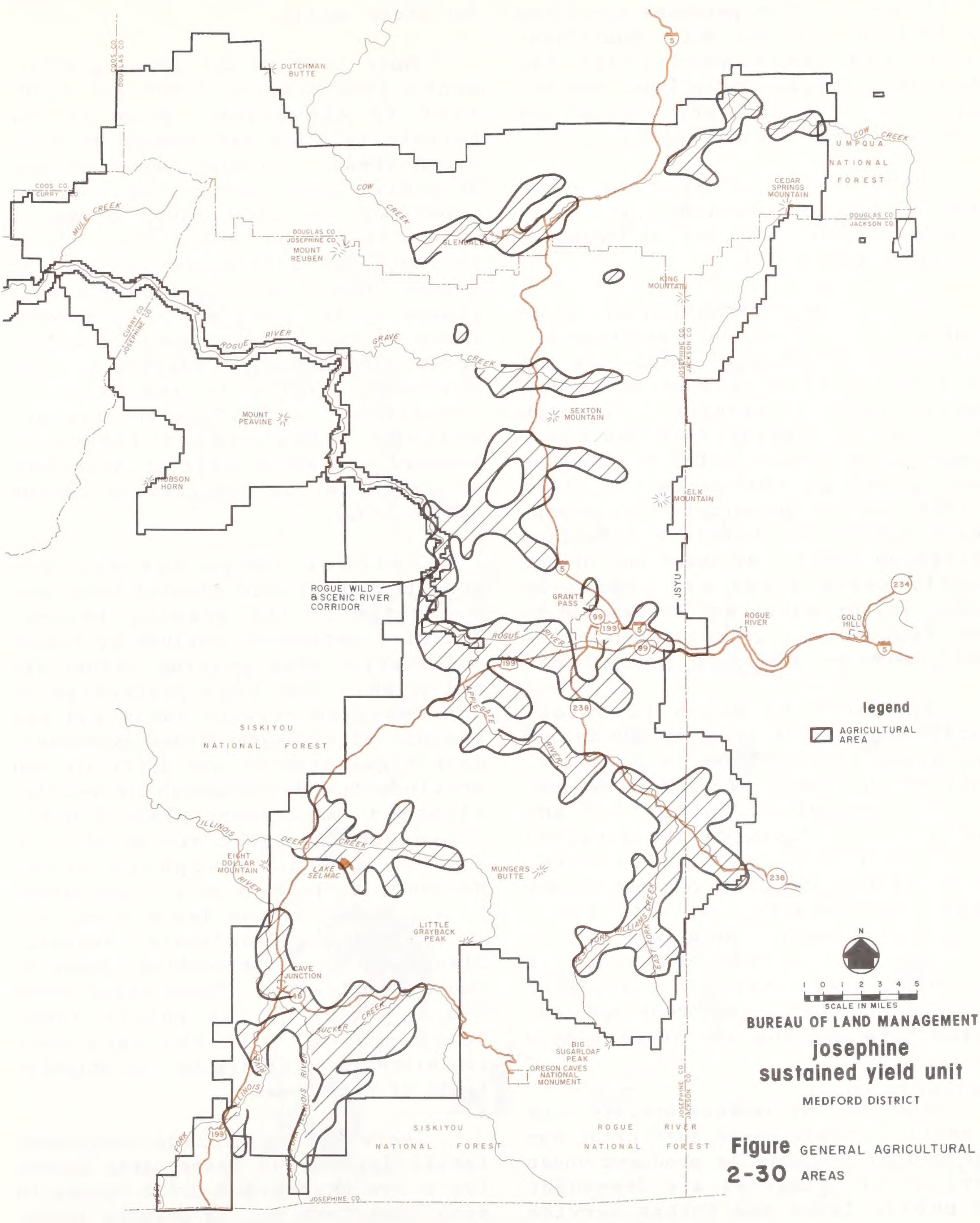


Figure 2-30 GENERAL AGRICULTURAL AREAS

they do not interfere with production of timber or other purposes specified in Section 1 of the Act. Qualifications and preference order for obtaining grazing privileges are set forth in Title 43, Part 4121 of the Code of Federal Regulations.

There are at present nine grazing leases covering 9,399 acres of public lands. All are in Josephine County (Figure 2-31).

Due to a combination of liver flukes, lower manpower requirements, and lessee preference, cattle are the only class of livestock using the public lands at present. Although the land is vegetatively and topographically better suited to sheep or goat grazing, the parasitic liver flukes cause high mortality in sheep, while cattle can tolerate infection (Siegmund 1967). At least one of the cattle lease areas was grazed by sheep in the past, but losses due to the flukes made it uneconomical to continue as a sheep operation.

The unit by which livestock forage on federal lands is quantified for production and use is the animal unit month (AUM). An AUM is defined as the amount of forage (of any combination of vegetative species) necessary for the subsistence, in a healthy state, of one mature cow (and calf under 6 months) for a period of 1 month. An animal unit is one mature cow (and calf under 6 months), five sheep, or equivalent numbers of other herbivorous species. Authorized grazing use is displayed in Table 2-52.

Most of the lessees operate from a small landbase where sufficient hay for winter feeding is produced under irrigation. Lessees are dependent on public lands and Forest Service lands for spring and summer forage for their cattle.

Most land in the grazing allotments lies between 2,000 and 3,000 feet in elevation. Much of the terrain is steep and covered by dense brush stands. Grazing is not allowed on public lands before April 1, and sometimes not before April 15, due to wet soil conditions in the early spring. The grasses normally dry up around July 15 after completing their growth cycle. Cattle tend to concentrate on the better grass, shrub, and wet meadow areas, resulting in some overuse. Water is available to livestock from surface sources and springs. Authorized livestock numbers use about half an acre-foot of water during the grazing season (Table 2-52).

Neither range surveys nor conditon and trend studies have been conducted on the grazing leases. District personnel conclude by visual observation that grazing values are not high. The high percentage of intermingled private lands and the absence of exchange-of-use agreements make regulation of use difficult and preclude the development of regular allotment management plans (AMPs). Consequently, there are no AMPs in effect in the Josephine unit. However, there is a Soil Conservation Service plan on one lease area, and an Interagency Coordinated Resource Plan written on the combined areas of two other leases. These plans cover the majority of the public lands being grazed, with the remainder administered according to the stipulations of each lease.

There are no grazing management facilities on the lease areas except for a few unrecorded drift fences to keep livestock out of private lands.

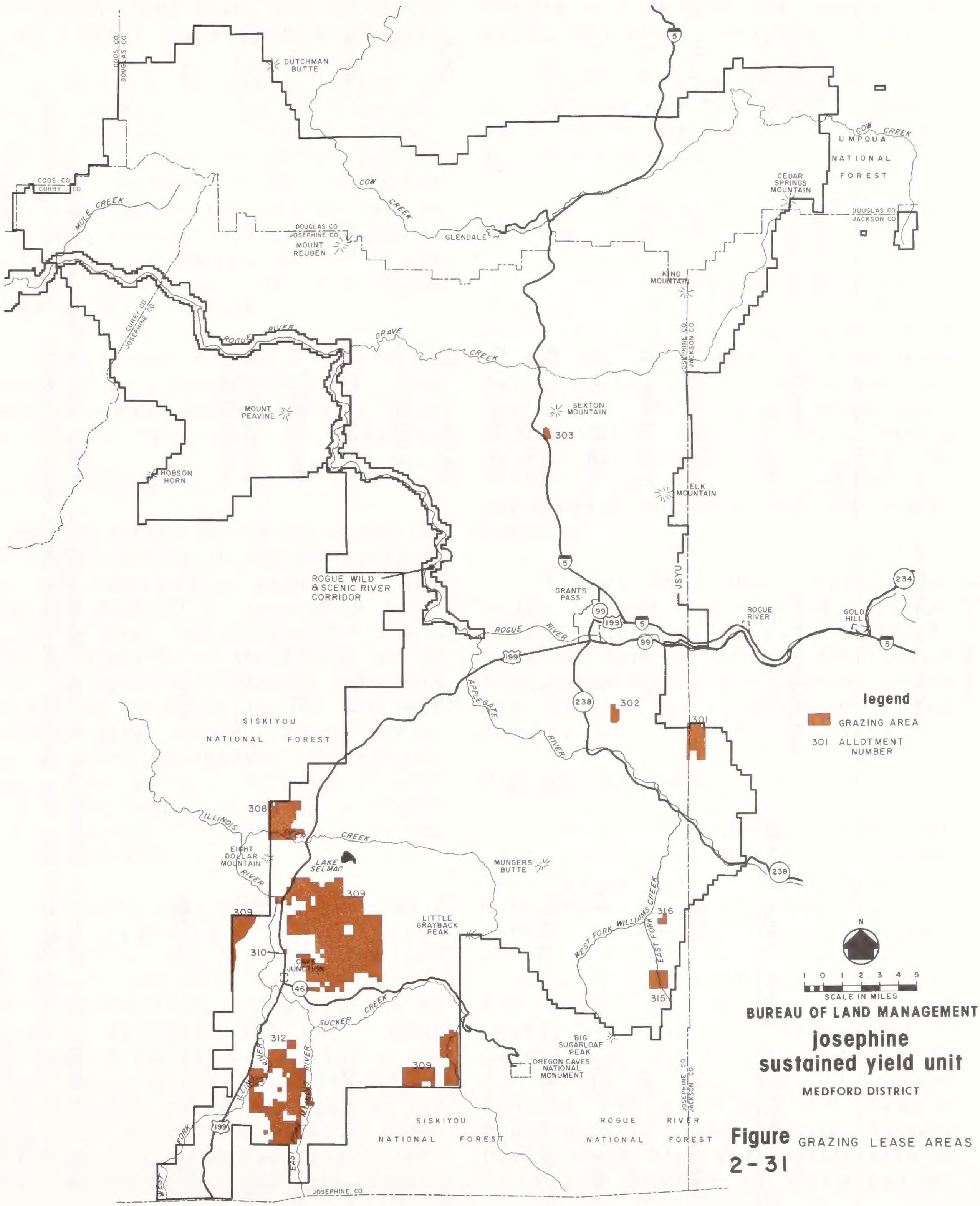


Figure 2-31 GRAZING LEASE AREAS

Table 2-52

Grazing Leases

LEASE NAME & NUMBER		LEASE AREA (ACRES)	ALLOWABLE USE (AUMS) 1/	NORMAL SEASON OF USE	FORAGE 1/ 2/ PRODUCTION (AUMS)	WATER REQUIRED (1,000 gal) 3/
Gillaspey	301	1,180	70	04/16-09/15	70	21.0
Rich	302	280	30	04/01-08/31	30	9.0
Johnson	303	30	8	04/16-05/15	8	2.4
Iverson	308	1,165	77	04/01-06/15 10/16-12/15 10/16-12/15	77	22.1
Sauer	309	1,672	96	04/16-07/15	96	28.8
Pfohl	310	15	3	11/01-02/29	3	.9
Duval	312	4,457	141	04/01-06/31	150	45.0
Freeborn	315	560	17	04/20-07/31	17	5.1
Brown	316	40	5	04/01-05/30 09/01-10/15	5	1.5
TOTAL		9,399	447		456	135.8

1/ AUM = Animal Unit Month = Amount of forage necessary to graze one animal unit for 1 month; an animal unit being one mature cow (and calf under 6 months) or the equivalent.
2/ Estimated
3/ Based on 300gal/AUM

Two operators trail between private land, public lands, and Forest Service lands. Most trail grazing occurs along county road rights-of-way.

Trespass on public lands of goats, horses, and cattle belonging to people living on unfenced private property adjacent to public lands is a general problem in the Josephine unit. The situation is difficult to cope with because of lack of manpower to detect trespass and enforce regulations and lack of identifying brands on the livestock.

There are no wild horses or burros in the Josephine area. Any horses or burros found on public lands are either astray or in trespass.

2.1.4.3 Mining

Mining activities in the Josephine SYU are primarily in the two categories of locatable minerals and saleable minerals. Locatable means minerals that are subject to claim under provisions of the Mining Law of 1872, as amended. Mineral materials subject to location in the SYU have included gold, silver, copper, chromium, mercury, manganese, molybdenum, lead, and zinc. Active nickel mining has begun recently at Eight Dollar Mountain in the southwestern part of the JSYU.

Saleable quarry products account for the majority of the mineral activities in the SYU. Crushed rock and gravel are used extensively in the construction and surfacing of roads associated with the Timber Management Program. Building and maintaining roads requires about 215,000 cubic yards per year in the SYU. This material is obtained under contract sale from specified sites administered by the BLM. No private demand for saleable materials exists presently in the SYU; private lands supply all demand for aggregate, sand, and road surfacing material.

There are no known leasable minerals within the JSYU. Leasable minerals include oil, gas, and other designated minerals.

2.1.4.4 Transportation and Utility Networks

Public transportation systems in the Josephine Sustained Yield Unit are limited by the rugged physical relief and low-to-moderate population density. Although major highways are few, the secondary ground transportation network is extensive, providing access primarily for logging and forestry practices of public land management agencies and the timber industry.

Figure 2-32 shows airstrips, major highways and roads, railway lines, and the Rogue River Trail. Detailed maps showing the location of BLM, county and some private roads are on file in each resource area office of the Medford District.

Highways and Roads

Interstate Highway 5 serves the west coast from Mexico to Canada, paralleling and sometimes coinciding with the old U.S. Highway 99. From Medford, southeast of the sustained yield unit, it proceeds westerly to Grants Pass and then northerly to Roseburg and Portland. Average traffic count on I-5 7 miles north of Grants Pass was 10,380 vehicles per day in 1975, according to Traffic Volume Tables for 1975 (Oregon Department of Transportation, Highway Division 1976). That publication is also the source of data below.

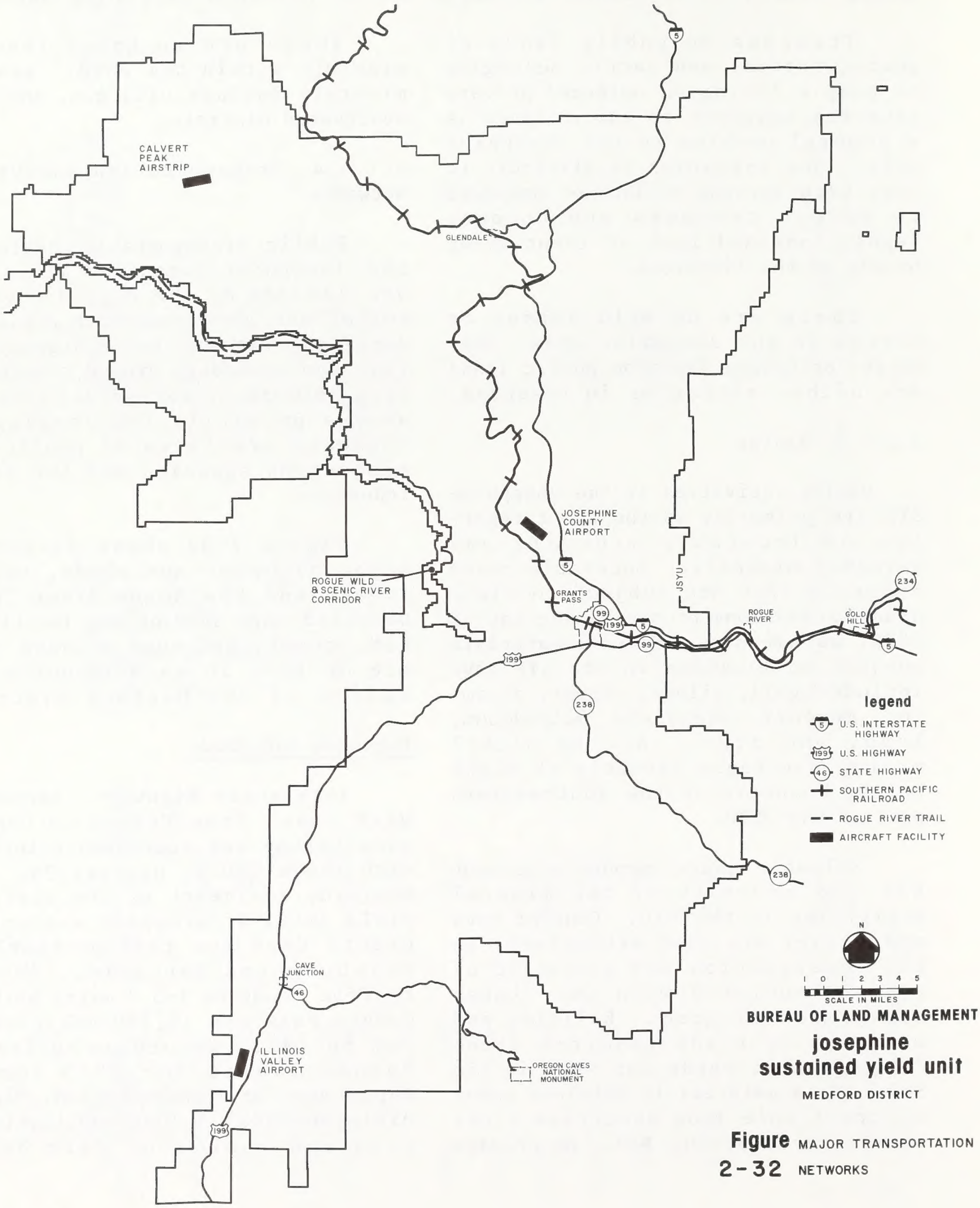


Figure 2-32 MAJOR TRANSPORTATION NETWORKS

U.S. Highway 199 runs from Grants Pass southwest through Cave Junction into California. Average traffic count on U.S. 199, at a point 1 mile north of the California-Oregon State line, was 1,965 vehicles per day in 1975.

State Highway 46 runs eastward from Cave Junction some 20 miles to Oregon Caves National Monument. Average traffic count on State Highway 46, at a point about 2.5 miles east of Cave Junction, was 960 vehicles per day in 1975.

State Highway 238 runs southward from Grants Pass to the Applegate River and follows the river upstream, exiting the SYU near Applegate community. Average traffic count on State Highway 238, at a point about 16 miles southeast of Grants Pass, was 800 vehicles per day in 1975.

All counties within the SYU have established extensive road systems providing access from valley situated areas, predominantly private lands, to the State highways. County roads provide the link between highways and timber roads systems.

BLM Roads

The BLM road system in the Josephine SYU contains approximately 1,900 miles of road including 142 miles of jeep (4 wheel drive) road. Of these, 1,126 miles are pit-run rock surface, 483 miles are crushed gravel surface, and 149 miles are bituminous surface. The basic BLM road system is shown in Figure 1-1. Approximately 13,000 acres of land are classified non-forest by virtue of their being occupied by roads.

BLM-administered roads are constructed to standards necessary to carry logging traffic and equipment for logging activities. Mainline roads have better grade and alignment, and their surfaces are often treated with gravel or bituminous material. Surface widths range from 17 to 24 feet. Tributary feeder and spur roads are constructed narrower and steeper than the mainlines, with pit-run (unprocessed) rock or natural dirt surfaces 12 to 17 feet wide.

Maintenance of the BLM-administered road system is accomplished directly by BLM or through maintenance provisions of road use agreements, right-of-way permits, and timber sale contracts. Annual road maintenance plans are prepared and updated as necessary, based on anticipated log hauling schedules of purchasers and permittees. Therefore, some roads get very little or infrequent repair, while others are maintained on a regular basis.

Air Transportation

Josephine County maintains a county airport at Merlin, 4 miles north of Grants Pass. The 75-by-4,000 foot asphalt-surfaced runway is in good condition, lighted, and has a 19,000-pound single-wheel weight restriction.

The Illinois Valley Airport, operated in conjunction with the U.S. Forest Service smokejumper base, is 3 miles south of Cave Junction on U.S. Highway 199. It has an asphalt surface and can be lighted on request. USFS has maintenance responsibility for the 75-by-5,200 foot runway, which has a restriction of 20,000 pounds wheel weight.

The Calvert Peak airstrip was constructed by the BLM about 18 miles west of the town of Glendale. Its

3,000-foot gravel-surfaced runway is in fair condition and maintained by BLM on a periodic basis, primarily used as an emergency fire suppression facility. It is not open to the public.

Railroads

The Southern Pacific railroad comes from California up through Medford, following the basic route of Interstate 5 to Grants Pass, where it meanders northward to the community of Wolf Creek, and from there northwest through Glendale on its way to Roseburg. The railroad provides commercial freight service but does not carry passengers (Loy et al. 1976).

Utility Systems

There are approximately 66 miles of rights-of-way for utility systems on public lands in the Josephine SYU. The right-of-way grants vary in quantity of acreage affected, because of variation in length and width of each grant. For instance, a 100 foot wide right-of-way for 1 mile involves about 12 acres, while a grant for a 200 foot wide right-of-way for 1 mile encloses about 25 acres. They limit surface management within their boundaries and necessitate special provisions for timber harvesting in their immediate areas. Construction road and service road rights-of-way over public lands are sometimes required for access and maintenance of facilities.

2.1.4.5 Recreation

All of the public lands within the Josephine SYU are available for dispersed recreation. Over 11,000 acres, mostly along the Rogue River, are specifically utilized or withdrawn for recreation purposes. Table 2-53 summarizes these recreation lands. Figure 2-14 shows the location of all public recreation sites throughout the Josephine SYU.

Rogue River Lands

The Wild and Scenic Rivers Act, Public Law 90-542 (1968) has withdrawn approximately 11,087 acres of public lands within one-quarter mile of the banks of the Rogue River for the preservation of scenic, recreational, geologic, fish and wildlife, historic, cultural, or other scenic values (Table 1-4). This withdrawal segregates the public lands from entry, sale, or other disposition under the public land laws and the mining and mineral leasing laws.

Other BLM Managed Recreation Lands

Shady Branch Campground, Deer Creek Campground and Cold Springs Campground were withdrawn in 1965 by Public Land Order 3869 from appropriation under the public land laws including the mining laws, but not mineral leasing laws, and reserved for public recreation.

2.1.4.6 Wilderness Values

Areas with wilderness values provide opportunities for renewal of the spirit, solitude, isolation, and being removed from the impacts and artifacts of human use. Most of the land with these values in the JSYU is in the vicinity of the Rogue Wild River. Portions of these potential primitive and wilderness areas are too rugged for recreation but are important for human-intolerant wildlife.

In early 1978, the Endangered American Wilderness Act set aside

Table 2-53
Recreation Lands, JSYU

Lands Managed by BLM

Site	Acres	Manager	Authority
Rogue Wild and Scenic River	11,087[1/]	BLM	PL 90-542
Shady Branch Campground	40	BLM	PLO 3869
Deer Creek Campground	40	BLM	" "
Cold Springs Campground	70	BLM	" "
Subtotal	150		

Total BLM 11,237 acres

Lands Leased to Other Governmental Units

Site	Acres	Lessee	Authority
Argo Recreation Site	82.7	Josephine County	Recreation & Public Purposes Act (R&PP)
Carpenter's Island	4.0	" "	"
Cathedral Hills	400.0	" "	"
Grave Creek Boat Ramp	22.8	" "	"
Hellgate Park	46.7	" "	"
Lake Selmac	48.5	" "	"
Rand Recreation Area	26.0	" "	"
Reuben Recreation Area	40.	" "	"
Highland Park	41.8	City of Grants Pass	"
Illinois River Forks State Park	80.	State of Oregon	"
Subtotal	792.5		

Lands Patented to Other Governmental Units [2/]

Site	Acres	Patentee	Authority
Ennis Riffle	50.	Josephine County	R&PP Act
Griffin Park	13.2	" "	"
Rough and Ready State Wayside	20.5	State of Oregon	"
Subtotal	83.7		

Total Recreation Land 12,113

1/ Public lands within the designated Rogue River Corridor, including acquired lands.

2/ Title passed to local government under provisions of the Recreation and Public Purposes Act. Each title document contains a clause for reversion of lands to the United States if not used in conformity with the provisions of the grant.

36,700 acres for the creation of the Wild Rogue Wilderness. This area includes approximately 8,900 acres of land administered by BLM (formerly identified as the Mule Creek Potential Primitive Area) and about 27,800 acres of land managed by the Forest Service. Of the land administered by BLM, about 90 acres are within the Rogue River corridor and about 405 acres are high intensity timber management lands. The rugged terrain of most of the area has not been conducive to logging practices, so the area remains uncut. Some evidence of early gold mining exists and jeep trails enter exterior portions of the area. An unmaintained hiking trail provides access to the interior. Figures 2-13 and 2-16 show the location of the Wild Rogue Wilderness.

Under the terms of the Federal Land Policy and Management Act of 1976 (FLPMA), roadless areas of 5,000 acres or more that have wilderness characteristics are to be reviewed within 15 years. The 1976 Act, however, also states that in the event of inconsistency between it and the O&C Act insofar as they may relate to management of timber resources, the O&C Act prevails. Accordingly, the wilderness review provisions do not apply to O&C lands which are suitable for sustained yield management as commercial timber lands.

Prior to the enactment of FLPMA, BLM had a process for designation of areas with wilderness characteristics as primitive areas. This process has been superseded by the wilderness review under FLPMA. While there are no designated primitive areas within the JSYU, certain areas have been described in terms of primitive characteristics.

Although not formally designated as a primitive area, the Rogue Wild River corridor is managed to maintain its primitive values--and is protected by the Wild and Scenic Rivers Act. In addition to the Rogue corridor, an extensive area (about 24,000 acres) traversed by the Rogue River has been identified as the Big Windy-Bunker Creek potential primitive area and meets broad primitive area criteria under pre-FLPMA procedures. Within this larger area is a central core of almost 12,000 acres (referred to in the draft ES as the Zane Grey roadless area), including over 2,900 acres of the Rogue Wild River corridor. While visitation in Big Windy-Bunker Creek is primarily associated with water-related uses in the Rogue River, hunters, hikers, and sightseers recreate throughout the area. Some unimproved trails exist, and one controlled-access jeep road connects Black Bar Lodge on the Rogue with the Galice Access Road to the south. For the most part, primitive values remain intact because the topography is not amenable to development for timber production. The area was heavily burned by wildfire several decades ago. Figure 2-16 shows the location of this area.

Red Butte is an unroaded, unlogged area of about 2,000 acres in the southeast corner of the JSYU. Recreation activity is limited, consisting mainly of ORV use, hiking, hunting, and related sightseeing activities. Adjacent land in the Rogue and Siskiyou National Forests has been inventoried by the Forest Service as "roadless" and is included in the Red Buttes Wilderness Council's proposal for wilderness designation.

In accordance with the BLM wilderness study provisions of FLPMA, the Brewer Spruce Research Natural

Area has been designated an instant wilderness study area. "Instant study areas" are those formally designated primitive and natural areas for which wilderness study reports must be submitted to the President by July 1, 1980. Approximately 2,090 acres of roadless land is adjacent to the existing 210-acre Brewer Spruce Research Natural Area.

Acreages for the Big Windy-Bunker Creek and Red Butte areas and Brewer Spruce Instant Wilderness Study Area are approximate. They were developed in response to Bureau budgeting program requests. It is quite likely that these acreage figures will change slightly as Bureau-wide criteria and procedures for wilderness study areas become explicit. A wilderness inventory of the JSYU has not been conducted.

2.1.4.7 Miscellaneous Land Uses and Designations

There are several administrative procedures by which the BLM may authorize secondary, or specialized, use of public lands. Right-of-way permits are one such means. They are generally used to authorize roads, highways, utility lines, communication sites and lines, and pipelines (see Transportation and Utility Networks, Section 2.1.4.4).

Withdrawals segregate areas of public lands for specific purposes such as for power projects, land or water reclamation, or recreation projects. Withdrawals also may segregate areas from the operation of specific public land laws, e.g., an area may be withdrawn from the Mining Law of 1872 in order to preclude prospecting on a developed recreation area.

Leases are authorized in certain cases. The types of leases being used in the Josephine SYU are Recreation and Public Purposes Leases (R&PP), Small Tract Leases, Mining Claim Occupancy Act Leases, Special Land Use Permits, and Section 15 Grazing Leases. Grazing leases have previously been discussed.

Designations to preserve public lands for special uses, such as Research Natural Areas, are provided for by law.

Research Natural Areas

Research Natural Areas are established and maintained for research and education and cannot be used in a manner which violates this primary intent. When necessary, the general public can be excluded or restricted in order to preserve the area.

The 210-acre Brewer Spruce Research Natural Area was established on January 29, 1965. The summit of Little Grayback Peak (elevation 5,445) and Rabbit Lake (a shallow, 0.5 acre pond) are within the designated area. The acreage has been set aside to protect an unusual association of plant species. Ten different species of conifers, including large amounts of Brewer spruce, are found here. The extensive brushfields are another outstanding feature. Sixty percent is forest, 25 percent is brushfield, and the remainder is bare rock outcrops and talus (Dyrness 1972). No facilities have been provided within the Brewer Spruce Research Natural Area, nor is research activity currently being conducted. Expansion of the RNA is being studied by the BLM. By July 1, 1980, the Brewer Spruce Research Natural Area will be reviewed and recommendations

made concerning suitability for wilderness designation.

A portion of Eight Dollar Mountain is being considered as a National Natural Landmark by the Heritage, Conservation and Recreation Service (HCRS). Designation as a National Natural Landmark would not affect BLM jurisdiction to manage the area. The HCRS, which is the lead agency in these investigations, has not yet completed the study. Active nickel mining of this area has begun.

The Woodcock Bog area contains qualities which could qualify it to be recommended as a Research Natural Area. It is also being considered as a National Natural Landmark. The presence of nickel ore makes the future of Woodcock Bog uncertain.

All three aforementioned areas are in the southwestern portion of the SYU (Figure 2-33).

Residencies

Small Tract Leases

Five-acre tracts leased under the Small Tract Act of June 1, 1938 (Repealed by P.L. 94-579) are occupied at two sites in the Josephine SYU. These sites are shown on Figure 2-33. These leases have expired and cannot be renewed under the repealed Small Tract Act, but are being reappraised. Residency will probably continue, although the type of leasing agreement is yet to be determined.

Mining Claim Leases

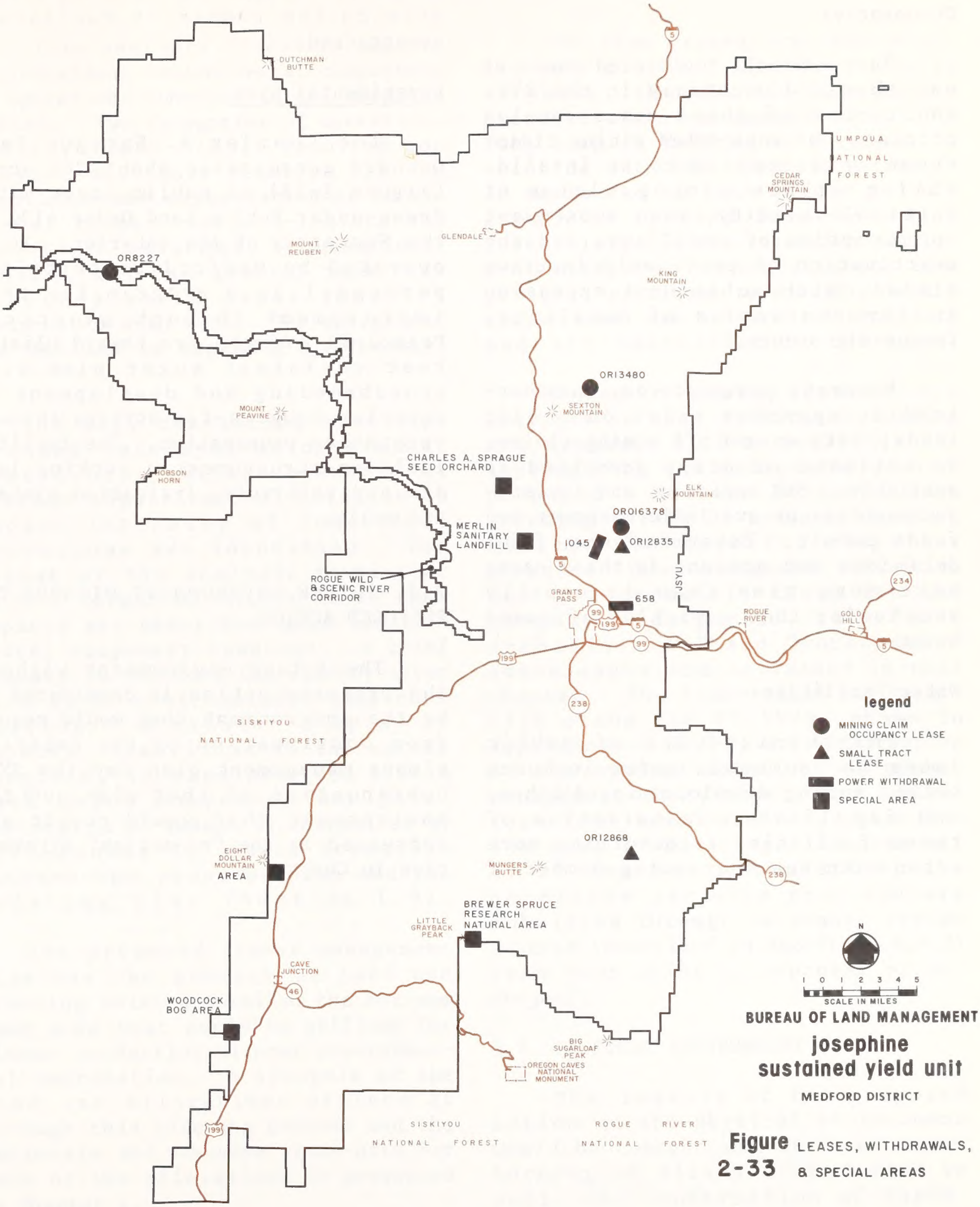
Two 5-acre tracts and one 2.5-acre tract have been leased on a life tenancy basis (Figure 2-33). The leases were granted on a rental basis under the provisions of the Mining Claim Occupancy Act of October 23, 1962.

Proposed Power Projects

There are 23 power withdrawals in the Josephine unit, involving about 29,018 acres of public lands. The general purpose of these withdrawals is to reserve public lands for future construction of water impoundments for hydroelectric power production or for the complementing transmission facilities. While withdrawals for these purposes segregate the public lands from entry, location, and disposal, they have no direct effect on surface resource management unless the power facilities (including reservoirs) have been or are being constructed.

Eight of the power withdrawals are partially if not wholly included in the Rogue River Wild and Scenic River Withdrawal (see recreation section). This withdrawal of lands adjacent to the Rogue River precludes development of power projects and effectively nullifies the power withdrawals. Thirteen other power withdrawals have been determined to be superimposed or unused. In all, 21 of the 23 withdrawals in the SYU are being recommended by BLM for revocation. Only Power Project #1045 and Power Site Reservation #658, totaling 19 acres, are not recommended for revocation.

Official restoration of public lands involving some 29,000 acres should take place in the near future.



BUREAU OF LAND MANAGEMENT

josephine sustained yield unit

MEDFORD DISTRICT

Figure 2-33 LEASES, WITHDRAWALS, & SPECIAL AREAS

Unauthorized Uses

Occupancies

There are 72 registered cases of unauthorized occupancy in the SYU. Thirty-one of these cases involve occupancy of unpatented mining claims known or suspected to be invalid. Filing of new mining claims of doubtful validity, with subsequent construction of dwellings, and the reactivation of previously inactive claims, with subsequent expansion and/or renovation of dwellings, frequently occurs.

Numerous unregistered, unauthorized occupancies exist on public lands, both on and off mining claims. No estimate of acres involved is available. BLM registers and investigates cases as available manpower and funds permit. Determinations, final decisions and actions in these cases take more time than is usually available; thus a backlog of cases exists.

Water Facilities

Unauthorized use of public lands for domestic water includes wells, spring developments, ditches, and pipelines. Installation of these facilities is occurring more often with the increasing number of residences on or immediately adjacent to public lands. No data are available on the number of facilities constructed.

Experimental Site

The Charles A. Sprague Seed Orchard encompasses about 200 acres (Figure 2-33) of public lands withdrawn under Public Land Order 4132 by the Secretary of the Interior. It is operated by Medford District BLM personnel in a program for tree improvement through genetics. Principal efforts are toward blister rust resistant sugar pine with crossbreeding and development of superior Douglas-fir strains through vegetative propagation. The facility includes structures, a parking lot, dam and reservoir, irrigation system, and wells.

2.2 FUTURE ENVIRONMENT WITHOUT THE PROPOSED ACTION

The future environment without the proposed action is considered to be the environment that would result from continuation of the existing timber management plan for the SYU. Continuation of that plan and the environment that would result are addressed as the "no-action" alternative in Chapter 8.

3. IMPACTS OF THE PROPOSED ACTION

This analysis discusses impacts on individual environmental components by operations inherent in the proposed action. Two categories of operations are involved: those required for harvest and those required for the assurance and augmentation of future timber crops. Table 3-1 lists the individual operations, by operational system, and the general impactors (factors which cause impacts) associated with each. The operations are defined in Appendix O, Glossary.

The many operations have been grouped into systems of similar operations. Within operational systems significant differences in impact intensity of individual operations are identified. The format of the analysis is similar to the format of Chapter 2 in that impacts are described under environmental component headings. A brief summary is provided immediately after each major environmental component heading. A tabular display of impacts, quantified to the extent possible, is also provided within each major component analysis. The degree of impact is determined by differences in impact intensity between the proposed plan and the existing plan (Section 1.9).

The proposed timber management plan was the product of land use planning which determined the maximum land area that could be utilized for timber production without environmental degradation. A synopsis of the land use allocations arrived at through this planning process and the rationale and resource trade-offs for each of the allocations is presented in Chapter 1.

Two time frames are used in the analysis process. The short term is 10 years, the planned life of the proposed timber management plan. The long term is defined as 60 years, to coincide with the approximate time it is estimated to take before all old growth is removed from commercial forest lands in the intensive management category. Other discrete time periods, pertinent to specific impact discussions, are utilized as necessary and are identified in the text.

A basic assumption of the analysis is that sufficient funding and manpower will be available for implementing the management plan as proposed. Because in many cases existing levels of resource data are limited and specific sites for proposed timber management activities are not presently known for the 10-year plan period, both "most probable case" and "worst case" assessments are addressed in this chapter. The timber sale and herbicide plans for FY 1979, shown in Appendices A and B, are illustrative of the typical locations of timber management activities. Such typical locations were used as a basis for the most probable case assessment. It is further assumed that the herbicide projects proposed are submitted through an annual review process (described in Section 1.6.4.2) each year prior to approval of any project.

3.1 PHYSICAL ENVIRONMENT

The impacts of the proposed action on the physical environment would be concentrated in three areas: burning of slash, disturbances to soil, and construction of roads.

Table 3-1
Operations and Impactors

OPERATIONAL SYSTEMS / SILVICULTURAL PRACTICES	ACREAGES	Chainsaw operation	Operation of off road vehicles	Operation of on road vehicles	Operation of stationary engines	Log dragging (skidding)	Blasting	Excavation	Deposition of overburden	Herbicide application	Road grading	Sideslope grading	Operation of scarifiers	Burning vegetation	Application of fertilizer	Felling merchantable timber trees	Felling non-commercial living trees	Felling dead trees (snags)
1. Two-stage shelterwood	*50,000	X		X												X	X	X
a. Regeneration cut	41,000	X		X												X	X	X
b. Final harvest	9,000	X		X												X		X
2. Clearcutting	5,000	X		X												X	X	X
3. Commercial thinning	4,700	X		X												X		X
4. Sanitation salvage	as necessary	X		X												X	X	X
YARDING/LOADING																		
5. Tractor methods	13,730	X	X	X		X												
6. Cable methods	45,970	X	X	X	X	X		X										
TRANSPORTATION SYSTEMS																		
7. New road construction	4,340		X	X			X	X	X	X	X	X	X	X		X	X	X
8. Road maint. & renovation	as necessary	X	X	X			X	X	X			X						
DEVELOPMENT AND PROTECTION PRACTICES																		
9. Slash disposal	*43,600	X	X	X	X	X												
10. Gross yarding/piling	33,500	X	X	X	X	X		X										
11. Burning	10,100		X	X										X				
12. Scarification	160		X										X	X				
13. Herbicide treatment	*47,700			X						X				X				
a. Site preparation	34,500			X						X								
b. Release	13,200			X						X								
14. Planting	*69,500		X	X										X				
a. Initial planting	41,000		X	X										X				
b. Replanting	12,300		X	X										X				
c. Replant or interplant	9,200		X	X										X				
15. Fertilization	18,900			X											X			
16. Precommercial thinning	14,200	X	X															
17. Fire suppression	as necessary	X	X	X	X									X		X	X	X
18. Silvicult. insect/disease cont.	as necessary	X	X	X	X	X								X		X	X	X

*CLASS TOTALS

The burning of slash would increase the levels of carbon monoxide, oxides of nitrogen, hydrocarbons, and particulates. The potential exists for the proposal to increase the level of particulate pollution above standards set by law; however, the project design features of the action would not allow burning to occur during weather that would cause concentrations of pollutants.

Disturbances to soil by compaction and surface disturbance would cause a reduction in productivity and erosion of some of the soil. Disturbances would be held to a minimum by close supervision of the timber sale by BLM personnel to ensure compliance with contract provisions.

Road construction would have impacts on water quality. Some road failure due to landslides would occur. Erosion from cutbanks and ditches would occur. Streams would carry more suspended sediment.

3.1.1 Climate

3.1.1.1 Silvicultural Practices

Two-Stage Shelterwood Harvest

Regeneration Cut

The impacts on climate in the immediate vicinity of the regeneration cut areas (41,000 acres) would be caused by increased extremes in air temperature, evaporation rates (closely related to relative humidity of the air), and air movement. Such changes in localized areas are termed micro-climatic effects.

Regeneration cuts are designed to provide enough shade to prevent lethal extremes of temperatures. However, localized problem areas would occur that could not be anticipated. An estimated 5,125 acres of the regeneration cuts would have some mortality of seedlings due to temperature extremes for the first 5 years. Over the long term, the effects would lessen as stands matured, eventually disappearing entirely.

Evaporation rates in areas subjected to regeneration cutting would increase in direct proportion to the percent of canopy removed. Relative humidities would decline in the cut areas from typically 80 percent levels to levels of 25 to 75 percent. This would tend to dry out non-woody plants an estimated 2 to 3 weeks earlier in the dry season. The effects would disappear after 6 to 10 years.

Air movement would increase in the areas subjected to regeneration cutting. The increase would be up to six times the level experienced near the ground in undisturbed forests. The impact of the increased air movement would be an estimated one tree lost to windthrow (uprooting of live trees by wind pressure) for each 3 acres subject to shelterwood harvest (Section 1.6.2). This represents a potential loss to windthrow of approximately 14,000 trees, most of which would be salvaged within 5 years. The total volume loss due to deterioration of windthrown trees would average 10 board feet per acre per year (professional estimates, Medford District). This amount is of minor significance in the JSYU.

Final Harvest Cut

The impacts to the microclimate due to final harvest cutting under two-stage shelterwood would be insignificant on the 9,000 acres that

would be involved. Stands of regenerated trees would be of such a density (3 feet average height) that microclimatic effects would be nullified.

3.1.1.2 Transportation Systems

New road construction would take place on 4,340 acres of previously undisturbed forest lands. Impacts to the microclimate would be the same as for regeneration cutting; that is temperatures, evaporation rates, and air movement would be increased in extremes. An estimated 542 acres of forested lands adjacent to the roads would have more frost and higher surface temperatures. Windthrow would result in a loss of 180 trees per year (most of which would be salvaged within 5 years), an insignificant amount.

3.1.1.3 Conclusions

1. Seedling mortality would be increased slightly, but not a significant amount. Therefore, impacts as a result of the proposed action are insignificant.

2. Loss of trees from windthrow would result in only a slightly significant decrease in the amount of timber harvested. Since most of the blowdown would be salvaged, microclimate changes have an insignificant impact on timber losses.

3.1.2 Air Quality

3.1.2.1 Silvicultural, Yarding and Loading, and Transportation System

Most operations involved in the silvicultural practices, yarding and loading practices, and transportation systems would impact air quality by adding internal combustion engine emissions and dust from vehicle movement to the air. A total of 173,640 acres of land would be subjected to some degree of occupancy by motor vehicles and other machinery operating from internal combustion engines (yarders, chain saws, etc.). In determining the amounts of pollution produced by the activities due to timber management on the JSYU, the following assumptions were made:

(1) Air pollution from internal combustion engines is uniform over the Southwest Oregon Air Quality Control Region.

(2) Travel by motor vehicles unrelated to forest management activities accounts for 80 percent of the emissions occurring in the JSYU.

(3) Activities are uniformly conducted over the course of the year.

The following amounts of pollutants would be produced by timber management practices outlined on the JSYU:

Pollutant	All sources	Timber management related
nitrogen oxides	707 tons/yr	141 tons/yr
sulfur oxides	23.3 tons/yr	4.7 tons/yr
carbon monoxide	2,566 tons/yr	513.2 tons/yr
particulates	42.2 tons/yr	8.44 tons/yr

The total for all sources represents 2 percent of the estimated source emissions of the Southwest Oregon Air Quality Control Region. The total for timber management related emissions of the JSYU represents 0.4 percent of the 1975 estimated source category emissions, an insignificant amount (figures calculated from ODEQ 1976a).

3.1.2.2 Development and Protection Practices

Slash Disposal

Slash disposal as a management practice would involve broadcast burning (burning of all combustible material over the entire subject area), and gross yarding (bringing cull logs and large slash to landings by cable). Gross yarding would result in impacts discussed previously in Section 3.1.2.1 since it would be part of the activity of yarding and loading. Broadcast burning would result in impacts to air quality.

In assessing the impacts of slash burning on air quality in the JSYU the following assumptions have been made:

(1) Project design features as stated in Section 1.6.4.2 would be applied; that is, burning would be suspended during periods of high air pollution and air stagnation.

(2) Burning would be conducted only upon concurrence of the Oregon Department of Forestry.

(3) Burning would occur only between October and April.

(4) All other factors contributing to air pollution in the JSYU would be uniformly dispersed over the Southwest Oregon Air Quality Control Region.

(5) Emissions from slash burning would be uniformly distributed over the JSYU.

The amount of slash, debris, and logging residue considered in the analysis would exist on the 10,000 acres proposed to be burned. No slash burning has been done on the JSYU over the past 5 years to October 1, 1977 (BLM File Data, OSO), so it is assumed that there will be no slash burning until the possible initiation of the proposal. Consequently, the proposed action represents an increase from no burning to 10,000 acres of burning over the 10-year time period, or 1,000 acres per year average.

The average volume of logging slash in the Douglas fir-hardwood forest type varies from 961 to 6,833 cubic feet per acre on clear cuts and partial cuts (Maxwell et al. 1976). In western Oregon, the volume of logging slash on BLM-administered and State lands averages 2,677 cubic feet per acre, as compared to 4,511 cubic feet per acre reported on national forests, and 1,507 cubic feet per acre reported from private lands in western Oregon (Howard 1971). Another publication lists volumes of 14,390 to 6,236 cubic feet per acre on national forest lands in western Oregon (Dell et al. 1971). After considering the type of timber that would be cut, the geographic location, and the age of most of the trees, an average figure of 2,400 cubic feet per acre was used in the analysis. This volume times the number of acres that would be burned equals 24 million cubic feet of slash that would be burned. Dividing this

amount by 10 years equals 2.4 million cubic feet of logging slash per year, the average volume that would be burned each year.

From reported ratios of debris volume to weight at eight logging sites in western Oregon, an average of 76.1 cubic feet per ton of slash was calculated (Ibid.). This figure is equivalent to a density of 26.28 pounds per cubic foot of slash. This density figure multiplied by the average volume of slash that would be burned equals the weight of the logging residue that would be burned. This amount equals 63 million pounds or 31,500 tons of logging residue.

Burning is a chemical reaction between the air and the slash which releases heat, gases, and particulates. Certain gases and particulates are used as measures of air pollution from slash burning; these are particulates, oxides of nitrogen, carbon monoxide, and hydrocarbons. The amount of each pollutant produced as each ton of logging residue burns multiplied by the weight of the slash equals the weight of the pollutants that would be produced (Sandburg et al. 1976). Table 3-2 illustrates the calculations of the analysis.

The airshed over the JSYU is assumed to be the area enclosed by the boundaries to a height of 10,560 feet, or 2 miles. This space is 2,656 cubic miles.

The amount of pollution that would enter the air equals the total weight of each pollutant produced divided by the volume of air space. The result is the amount of air pollution that would be caused by slash burning, in tons per cubic mile. This amount compared to the existing background levels is the increase (expressed in percent in the analysis) that would be attributable to the slash burning (See Table 3-2).

The emission of particulates is of concern in this analysis since measured amounts have been high. The potential emission of 0.101 tons per cubic mile of particulates can (for comparison) be converted to micrograms per cubic meter (the standard measure of particulate pollution at air pollution monitoring stations). The 0.101 tons per cubic miles equals 22.0 micrograms per cubic meter ($\mu g/AA^3$)of particulates annually. On a daily basis, the amount would be 0.060 $\mu g/m^3$. This compares to the measured average value (at Grants Pass) of 58 $\mu g/m^3$, a 0.1 percent potential increase.

The calculated 0.101 tons per cubic mile appears disproportionately large compared to the calculated average amount of micrograms per cubic meter. In fact, these two methods of measurement are not interchangeable. They are included in analysis to explain the two methods of expression. The amounts measured in tons per cubic mile are general qualities; the amounts in micrograms per cubic meter are measured weights of samples extracted from fixed volumes of air at monitoring stations. No relationship exists between measured particulate values (from air quality measuring sites) and yields per ton of particulates from burning fuels (Hall 1972). Since smoke particles are so small (0.002 to 0.3 microns), they do not settle from the air but remain suspended for days or even months (Fritschen et al. 1970). The material found in the air pollution monitoring sites in the Southwest Oregon Air Quality Maintenance Region is fugitive

Table 3-2

Potential Air Pollution Caused by Slash Burning in the Proposed Action

Amount of slash that would be burned	Pollutant produced by burning slash	Weight of pollutant produced per ton of slash burned (lbs/ton)	Calculated weight of pollutant produced by the proposal each year (pounds)	Volume of airshed (cubic miles)	Amount of pollutant per volume of air (tons/cubic mile)	Existing level of pollutant per volume of air (1975) (tons/cubic mile)	Potential increase
31,500 tons	particulates	17	536,000 lb.	2,656	0.101	1.088	9.3 %
	carbon monoxide	60	1,890,000 lb.	"	0.356	7.598	4.7 %
	hydrocarbons (as C)	12	378,000 lb.	"	0.071	No data	-
	oxides of nitrogen	2	63,000 lb.	"	0.012	1.877	0.6 %

dust (soil particles) and fly ash from plywood factories (ODEQ 1976a).

Since pollution from burning forest vegetation (wild fire and controlled burning) accounts for 23.7 percent of the particulate pollution and 6.9 percent of the hydrocarbon pollution produced annually in the United States (Sandberg et al. 1975), the burning of slash is rightly of concern. However, the amounts of potential increase in pollutants (Table 3-2) seem large compared to the amount of slash proposed to be burned. The reason lies in the assumption of the analysis that all the fuel on the 10,000 acres would be burned, with the resulting smoke rising into a fixed quantity of air (like a match burning in an inverted bottle). Actually, the mixing of the air by wind would quickly disperse the pollutants produced by the proposed action. Under the assumed management guidelines, no burning would be done on days when there was no atmospheric mixing or movement. The smoke would not fill the airshed, to the extent allowed by the amount of the slash burned, as though it were a closed container. Instead, the smoke would rapidly dissipate, reaching background levels after traveling several miles. The effects of the smoke would be felt in the immediate vicinity of the burned area (within a 5-mile radius), with an impact of reduced visibility within that radius (Fritschen et al. 1970). Since all burning would be conducted during periods of dispersive air movement, impacts to air quality would be negligible.

Herbicides

Herbicide application by aircraft would involve the spraying of mixtures of herbicides, carrier (material in which the herbicide is suspended), and small amounts of other additives (emulsifiers and wetting agents). The specific chemicals involved would be chosen in accord with the project design features outlined in Section 1.6.4.2.

The atmosphere would be used as a dispersive and transmittal medium in aerial application of herbicides. Although droplets of herbicide mixture would be of such a planned size so as to drop through the air in a minimum of time to reach the vegetation objective, some dispersion of the herbicide and carrier would be inevitable. In order to determine the amount of herbicide and carrier that would enter the atmosphere as a contaminant (component of the fluid atmosphere that normally does not occur within that particular locality), the following assumptions have been made:

(1) The rate of dispersal over the target area would be held to a minimum by good management practices so that only a minor amount would be volatilized to the atmosphere (Johnson 1975), here estimated to be 5 percent of the herbicide and vehicle.

(2) The volatilized component of the spray would disperse uniformly into the atmosphere around the target area.

Based on these assumptions, totals of herbicides and diesel oil carriers are presented in Table 3-3. The summary totals of diesel oil carrier that would be used equal 110,000 to 400,000 gallons. For this analysis it is assumed that 5 percent of the diesel oil carrier would be volatilized to the atmosphere, thus becoming a pollutant. Therefore,

Table 3-3

Estimated Herbicide Applications for the JSYU over Ten Years

Herbicide	Estimated acres	Application total of diesel oil carrier 1/	Application total of herbicide
For Release (Applied during the Dormant Season)			
2,4,5-TP (silvex)	9,000	45,000-180,000 gal	2,250-6,750 lbs.
2,4-D	9,000	45,000-180,000 gal	2,250-6,750 lbs.
Roundup	1,000	NA	250 lbs.
Krenite	1,000	NA	250 lbs.
Atrazine	1,000	NA	4,000 lbs.
Dalapon	1,000	NA	3,000-11,000 lbs.
For Site Preparation (Applied prior to planting)			
2,4,5-TP (silvex)	20,000	10,000-20,000 gal	5,000-15,000 lbs.
2,4-D	20,000	10,000-20,000 gal	5,000-15,000 lbs.
Roundup	5,000	NA	15,000 lbs.
Krenite	5,000	NA	15,000 lbs.
Atrazine	15,000	NA	45,000-60,000 lbs.
Dalapon	5,000	NA	15,000-55,000 lbs.

1/ Based on an application rate of 15 gal/acre for release, and 0.5 to 1.0 gal/acre for site preparation as maximum amounts of carrier that would be used.

(Source: USFS 1976)

5,500 to 20,000 gallons of diesel oil would enter the airshed of the JSYU over 10 years. An average amount of 1.51 gallons to 5.48 gallons of diesel oil would enter the airshed of the JSYU each day (on an average basis). This is an insignificant amount.

In estimating the amount of herbicide drift that would enter the atmosphere as a contaminant (atmospheric pollutant), it is very difficult to estimate amounts and rates due to the number of chemicals involved and their individual properties. In this analysis it is assumed that 5 percent of each specific herbicide would be volatized as an atmospheric contaminant. Table 3-4 presents the amounts of herbicides that would enter the airshed of the JSYU over the 10-year period of the proposed action, and as an average daily basis. The amounts of herbicides which contaminate the air given in Table 3-4 are estimates of worst case values. Actual amounts would vary with atmospheric conditions during application; the contamination of the air by herbicides is not expected to have significant impacts to the airshed (Gratkowski 1974).

Table 3-4

Estimated Amounts of Herbicide Applications Entering the Airshed of the JSYU as Contaminants

Herbicide	Total contamination for proposal period	Average daily contamination of the air over the JSYU
2,4,5-TP[1/] (Silvex)	362.5 to 1,087.5 lb	0.099 to 0.298 lb
2,4,-D	362.5 to 1,087.5 lb	0.099 to 0.298 lb
Roundup	762.5 lb	0.209 lb
Krenite	762.5 lb	0.209 lb
Atrazine	2,450 to 3,200 lb	0.671 to 0.877 lb
Dalapon	900 to 3,300 lb	0.247 to 0.904 lb

1/ Silvex contains a contaminant known as "Dioxin" or "TCDD" which is discussed separately in the Water Resources Section of this chapter.

3.1.2.3 Conclusions

1. Slash burning would increase particulates in the air and decrease visibility within a 5 mile radius of the burn. Impact on the quality of the airshed, however, is insignificant.

2. Impacts of combustion products from slash burning on air quality are insignificant.

3. Increased air pollution as a result of the addition of internal combustion engine emissions to the airshed would have an insignificant impact when compared to additions from other sources.

4. Volatilization of herbicides and diesel oil carrier is not expected to adversely impact air quality in the JSYU.

3.1.3 Soils

3.1.3.1 Silvicultural Practices

In this portion of the analysis, only the disruptions of the soil caused by removing the trees from the forest are considered. The impacts of the physical means used to remove and transport the trees as logs are considered in subsequent sections of this chapter.

Two-Stage Shelterwood Harvest

Removal of trees from a forest environment interrupts the natural cycling of nutrients within the soil. Loss of nutrients from forest soils occurs after logging has removed all or part of the trees (Sopper 1975). In one study of partial cutting (in which some trees in the plot were cut and left in place, with no yarding or loading operations, and no road construction) net nitrogen mobilization increased 2.3 times over the undisturbed rate on an average basis over 3 years (Hornbeck et al. 1974 In Sopper 1975).

Present nitrogen losses from undisturbed forest lands in western Oregon have been measured as 0.16 lbs. per acre per year (Fredriksen 1971 In U.S. EPA 1976). This measurement does not consider the impacts on nitrogen from microbiotic activity, precipitation, and particulate settling, especially pollen, smoke particles, and road dust (Fredriksen 1972 In Franklin et al. 1973a). Since the regeneration cut of the two-stage shelterwood practice is removal of up to 60 percent of the trees, it is assumed that the same net mobilization of nitrogen observed by Hornbeck et al. would occur after this practice on the JSYU. Therefore, 15,088 pounds of nitrogen per year for 3 years (a total of 45,264 pounds) would be lost from the soil due to the regeneration cut on 41,000 acres.

The loss of phosphorus from western Oregon forest ecosystems has been measured as "about in the same order of magnitude as outflow for nitrogen" (Fredriksen 1971 In Franklin et al. 1973a). Therefore, it is assumed that the losses of phosphorus from the soils of the JSYU would be proportional to calculated amounts of nitrogen lost from the areas subjected to regeneration cut. The observed loss from an undisturbed western Oregon forest ecosystem has been 0.0936 pounds per acre per year. Therefore, the net outflow would be 2.3 times this total, or 0.215 pounds per acre per year. The length of time that such increases in phosphorus movement would occur is assumed to be 3

years. Therefore, the net loss of phosphorus from the soils of the areas subjected to regeneration cut would be 8,826 pounds per year, or a total loss of 26,479 pounds of phosphorus (Ibid.).

Potassium losses were observed as 0.28 pounds per acre per year (average over 2 years) in the same undisturbed ecosystem (Ibid.). After partially cutting a previously undisturbed forest, potassium losses increased by 1.5 times (Hornbeck et al. 1974 In Sopper 1975). Therefore, the assumed loss of potassium from the JSYU due to the regeneration cut would be 0.42 pounds per acre per year. Assuming the same 3-year loss time prior to a return to background levels of nutrient discharge, a total of 17,220 pounds of potassium would be lost per year from the soils subjected to regeneration cut, or a total loss of 51,660 pounds of potassium.

Losses of two other nutrient cations (positively charged atoms), calcium and magnesium, were observed as 1.054 pounds per acre per year (averaged over 2 years in the undisturbed forest) (Fredricksen 1971 In Franklin et al. 1973a). Assuming a time frame and loss increases similar to that for potassium, the total loss of calcium and magnesium would be 64,821 pounds per year, or a total loss of 194,463 pounds.

The same procedures of analysis (made under the same set of assumptions) were used to determine impacts to the soils of the final cut (of 9,000 acres) of the two-stage shelterwood cut. Table 3-5 illustrates the total amounts of nutrient losses anticipated to occur on the areas subject to the silvicultural practices.

Clearcutting

The 5,000 acres that would be clearcut would undergo maximum nutrient mobilization when the vegetation was removed (since in practice, essentially all vegetation is removed from the subject area). Also, clearcut areas would be subjected to broadcast burning, which effectively converts all nutrients in the organic fraction of the soil (surface residue, litter layer, and organic horizon) to soluble form in ash. In this analysis, it is assumed that all areas subjected to clearcutting would be subsequently subjected to broadcast burning as a management practice.

Nitrogen losses would increase from an estimated 0.16 pounds per acre per year to 4.6 pounds per acre per year the first year after cutting and burning. The losses would return to background levels after 6 years (estimated from results in Fredriksen 1971; Brown et al. 1973 In U.S. EPA 1976). Therefore, the total average loss of nitrogen from the lands subjected to clearcutting would be 2.38 pounds per acre per year, or a total of 14.28 pounds per acre of nitrogen lost as a result of clearcutting. Therefore, the total estimated loss of nitrogen would be 71,400 pounds on the 5,000 acres clearcut and burnt as a result of the proposal.

The same order of magnitude of phosphorus loss from the soil ecosystem is assumed for clearcutting as for the two-stage shelterwood system. The total loss of phosphorus from the 5,000 acres clearcut and burned would increase from an undisturbed value of 0.0936 pounds per acre per year to 0.223 pounds per acre per year mobilized. Therefore, the total amount of phosphorus that would be

Table 3-5

Nutrients Mobilized in the Soil Ecoystem as a Result of the Silvicultural Practices[1/]

Silvicultural Practive	Nutrient			
	Nitrogen	Phosphorus	Potassium	Calcium & Magnesium
Two-stage shelterwood				
Regeneration cut (41,000 acres)	15,088 lb./yr 45,245 lb Total	8,826 lb./yr 26,479 lb. Total	17,220 lb./yr 51,660 lb. Total	64,821 lb./yr 194,463 lb. Total
Final cut (9,000 acres)	3,312 lb./yr 9,936 lb. Total	1,938 lb./yr 5,812 lb. Total	3,780 lb./yr 11,340 lb. Total	14,229 lb./yr 42,687 lb. Total
Clearcut (5,000 acres)	71,400 lb. Total	4,749 lb. Total	173 lb. Total	1,389 lb. Total
Commercial thinning (4,700 acres)	865 lb./yr 2,594 lb. Total	505 lb./yr 1,516 lb. Total	987 lb./yr 2,961 lb. Total	3,715 lb./yr 11,146 lb. Total
Pre-commercial thinning (14,200 acres)	No estimation can be made due to lack of research data (U.S. EPA 1976)			
Sanitation salvage	As required (Acreage figures subjected to disturbance may release large quantities of nutrients (EPA 1976(2))			
Total	129,194 lb.	38,556 lb.	66,134 lb.	249,685 lb.

1/ These numbers are calculated values from research results on experimental forests in the western United States. They are presented here to illustrate the effects of removing trees from forest ecosystems. The figures given are qualitative; they should not be accepted as absolute values.

released would be 4,749 pounds. Phosphorus, however, is relatively immobile in soil ecosystems so although the 4,749 pounds of phosphorus would be changed from an organic form to a mineralized form, little would be expected to move from the soil (Brown et al. 1973 In U.S. EPA 1976).

A smaller amount of potassium would be released by the clearcutting and burning. An estimated 0.03456 pounds per acre of potassium would be lost after logging and burning; or a total loss of 173 pounds potassium due to the practice (DeByle and Packer 1972 In Sopper 1975).

Losses of calcium and magnesium would be 0.2778 pounds per acre for the 5,000 acres subjected to clearcutting and burning, a total loss of 1,389 pounds (Ibid.).

The time frames for the length of time the loss would occur on the 5,000 acres subjected to clearcutting are very difficult to estimate. In this analysis, it is assumed that the impacts to phosphorus would occur over 1 year, those for potassium, 6 months; and those for calcium and magnesium, 4 years.

Commercial Thinning

Very little research has been done on the effects of commercial thinning alone on the soil resource (EPA 1976). In this analysis it is assumed that the areas subjected to commercial thinning would receive 50 percent of the impacts to the soil resource as those experienced in two-stage shelterwood harvesting. The total amounts of impacts in terms of nutrients mobilized from the soil ecosystem are summarized in Table 3-5.

Sanitation Salvage

Sanitary salvage would include windthrow harvest, insect infestation (in which trees are cut and burned in place), and salvage after wildfire. Since sanitation salvage would be done on an "as required" basis, it is impossible to estimate the actual impacts to the soil resource alone.

Conclusion

The overall mobilization of nutrient compounds due to the silvicultural practices would result in some loss by leaching. The expected loss would be in the order of 0.5 percent for phosphorous, 1.1 percent of the potassium, 1.5 percent of the magnesium, and 0.6 percent of the calcium in the upper 12 inches of the soil (Sopper 1975). Losses of nitrogen would vary with the type of cutting practice, the amount of organic matter in the soil, and the amount of precipitation on the specific site involved. Leaching losses of nutrients other than nitrogen would be insignificant. Impact of nutrient losses on soil fertility as a result of silvicultural practices would be adversely significant for nitrogen, but insignificant for phosphorus, potassium, calcium, and magnesium.

3.1.3.2 Yarding and Loading

Tractor Methods

Tractor logging would be done by crawler tractors equipped with tracks, and by rubber-tired skidders. Both types of vehicles would be equipped with a variety of winch and/or hydraulic leverage attachments for efficiency in yarding (moving logs from their resting place after

cutting to the place where they are loaded on trucks).

Both types of vehicles would move about within the forest, skidding (moving the logs by hoisting or dragging) logs to loading areas. With repeated passage of tractors and skidders, trails would be created.

The impacts to the soils would occur on the skid trails as repeated passage by the logs and heavy equipment disturbed and compacted the surface layers of soil. Disturbed soil, in which the organic layer has been removed or mixed with the underlying mineral fraction, would be subject to increased erosion. The repeated passage of logs and equipment would compact the soil, reducing the infiltration rate.

The total area of the JSYU that would be subjected to disturbance and compaction by tractor methods would be 26,891 acres (Table 3-6). Assuming this area is presently in an undisturbed state, the present amount of erosion that is occurring from these lands is 1,890.8 tons per year (based on the previously defined rate of 45 tons per square mile per year). The anticipated amount of erosion that would occur on the 26,891 acres would equal 3,025 tons per year (Megahan 1972 In U.S. EPA 1976), with a variability of plus or minus 50 percent (Ibid.), an increase of 1,134 tons the first year. This erosion would continue at a decreasing rate for an estimated 4 years. The total soil that would erode (from place of origin to an unknown point of deposition) would be 7,563 tons, an increase of 2,835 tons. After the 4 years, the erosion rate would again equal that estimated as an average for undisturbed lands on the JSYU.

Cable Methods

Cable logging, in which logs are either dragged or suspended to yarding areas, would disturb 3,968 acres and compact 1,162 acres (Table 3-6). Since cable logging does not require the repeated passage of heavy equipment over trails (as in tractor yarding), surface disturbance and compaction would be less by a factor of over 50 percent (Rice et al. 1972 In U.S. EPA 1973). Therefore, the amount of additional erosion that would occur on the 5,130 acres as a result of cable yarding would be 108.2 tons per year for an estimated 4 years, declining at the same 25 percent per year. The total increased erosion after 4 years would be 270 tons of soil. Thereafter, the erosion would return to background levels.

Conclusion

The erosion that would result from the yarding and loading practices would be estimated as that amount of soil that would move from its place of origin to some other place of deposition (other than a stream channel). Such erosion is termed sheet erosion. There would be site specific impacts of varying degrees of significance to the site involved. Overall, the impact of soil losses on soil productivity would be of very minor significance over the whole of the JSYU.

3.1.3.3 Transportation System

New Road Construction

In the proposed action, 500 miles of permanent road would be constructed on 4,340 acres of previously undisturbed lands. The impacts

Table 3-6

Soil Disturbance and Soil Compaction Attributable to Yarding and Loading--Worst Case Analysis

Cutting	Acres	Soil disturbance factor	Total acres of soil disturbance	Soil compaction factor	Total acres of soil compaction
Tractor Systems					
Shelterwood (high intensity lands)	34,650	36 %	12,474	26 %	9,009
Shelterwood (low intensity lands)	3,850	36 %	1,386	26 %	1,001
Clearcut	3,850	36 %	1,386	26 %	1,001
Commercial thinning	4,230	10 %	423	5 %	211
Subtotal	46,580		15,669		11,222
Cable Systems					
Shelterwood (high intensity land)	10,350	31 %	3,209	9 %	932
Shelterwood (low intensity lands)	1,150	31 %	356	9 %	103
Clearcut	1,150	31 %	356	9 %	103
Commercial thinning	470	10 %	47	5 %	24
Subtotal	13,120		3,968		1,162
Total yarding and loading	59,700		19,637		12,384

of road construction in the forests of western Oregon has been the object of many studies. Forest roads have been recognized as a major factor contributing to erosion in the western Cascade Mountains of Oregon (Fredriksen 1970). Logging roads have been identified as the major cause of erosion resulting from silvicultural activities (U.S. EPA 1975). Logging roads are the main factor in soil movement and stream siltation (BLM 1959).

In the Douglas-fir region, only a third of the area of a typical road is occupied by the road bed; cut and fill slopes account for the remainder (Dunford 1962 In Anderson et al. 1976). For every mile of road built, 8 acres of cutbanks, fills, and ditches are required (Usher 1961 In Anderson 1976). Therefore, the 4,340 acres that would be disturbed when 500 miles of permanent road were constructed would approximately equal the theoretical 4,000 acres anticipated by previous research.

The previously estimated erosion rate for the undisturbed lands on the JSYU is 45 tons per square mile per year, or approximately 0.07 tons per acre per year. The increase in erosion due to logging roads would be 220 times this figure, or 15.4 tons per acre per year. Therefore, the total amount of erosion that would occur due to new road construction would equal approximately 66,500 tons per year, decreasing at a rate of 25 percent per year for 4 years to background levels. The total erosion due to new road construction would equal approximately 166,300 tons over 4 years (calculated from Megahan 1972 In U.S. EPA 1976).

Reconstruction and Maintenance

The number of miles of road requiring reconstruction and renovation in the JSYU is variable from year to year (see Section 2.1.4.4). Factors such as the degree and intensity of use, extreme weather events, and normal wear determine the need for reconstruction. Maintenance (the blading and otherwise keeping of the road surface in a usable condition) occurs constantly; however, it is directed to areas of greatest need (which cannot be anticipated by this level of analysis) based on intensity of use. It is very difficult to estimate the amount of erosion that would occur due to reconstruction and maintenance. Over the 10-year period of the proposed action, an estimated 7,500 tons of soil would be eroded due to reconstruction and maintenance.

The total erosion due to road construction, reconstruction, and maintenance would equal approximately 174,000 tons (by calculation and estimation). This loss of soil would have a significant adverse impact upon soil productivity if topsoil were the main loss.

3.1.3.4 Development and Protection Practices

Slash Disposal

In this analysis, the volume and mass of slash previously calculated for the analysis of impacts to air quality from broadcast burning is applied to 33,500 acres that would be gross yarded. Therefore, it is estimated that 2,400 cubic feet per acre of slash would be gross yarded on 33,500 acres of harvested lands. This would amount to 80,400,000 cubic feet of cull material, slash, and

other debris that would be stacked and piled on cut-over lands over the 10 years of the proposed action. It is assumed that much of this material would be hauled away by firewood cutters, as the yarded material would be immediately adjacent to logging roads. It is possible that some small amount of material would be burned, but this is impossible to quantify. Slash disposal would have no significant impact upon the soil resource.

Scarification

Scarification would occur on 160 acres under the proposed action. The practice of scarification is assumed to be equivalent to soil preparation for planting of row crops in forest lands. The erosion rate for undisturbed lands has previously been defined (Section 2.1.1.3) as 0.07 tons per acre per year (45 tons per square mile per year). The disturbance due to scarification would increase this rate by 100 to 1,000 times. Therefore, erosion on the 160 acres subjected to scarification would equal 1,125 to 11,250 tons per year, decreasing at a rate of 25 percent per year over 4 years reaching background levels. The total amount of erosion that would occur over the 4 years would equal 2,812 tons to 28,125 tons, in the worst case (calculated from Brown 1960 In U.S. EPA 1976). This would have significance to soil productivity at the site involved, but it would be an insignificant increase in relation to the entire JSYU.

Herbicide Application

Herbicides would be applied in the JSYU for preparation of sites for planting new seedlings and for release of young trees from competing vegetation. Different densities of vegetation would be sprayed under the two techniques; therefore, different proportions of the forest floor would be exposed to the herbicide sprays.

Because some areas would be treated with a succession or combination of herbicides, the number of acres that would be subjected to the spraying is greater than the total number of acres treated. Table 3-7 illustrates the applications of the herbicides that would be used on the JSYU, estimated percentages of the herbicides and diesel oil carrier that would enter the soil of the treated areas.

Soil Contamination

The greatest possibility of losing chemical residues during overland flow, either in solution or attached to soil particles, occurs on bare soil that has been sprayed after being compacted by timber harvest or road building activities. The leaching or movement of herbicides with water through the soil is a factor to be considered not only in determining their maximum effectiveness but also projecting their potential impact on water supplies. This movement is related to the degree of adsorption of the chemicals and to the amount and intensity of water movement.

The finer the soil texture and the greater the amount of organic matter, the more ability the soil has to adsorb chemicals. Leaching is therefore less likely in a clay soil than in a sandy soil. Treatment areas located on the somewhat excessively drained Siskiyou gravelly sandy loams in the Klamath Mountains have a greater leaching hazard than would those located on the moderately

Table 3-7

Estimated Herbicide Amounts Entering the Soils of the JSYU

Herbicide	Acres	Total application of[1/] herbicide and carrier	Estimated percent reaching soil[2/]	Total of herbicide and carrier in soil[1/]
Release				
(Silvex)		2,250- 6,750 lb		405- 1,215 lb
2,4,5-TP	9,000	45,000-180,000 gal	18	8,100-32,400 gal
		2,250- 6,750 lb		495- 1,485 lb
2,4-D	9,000	45,000-180,000 gal	22	9,900-39,600 gal
Roundup	1,000	250 lb	12	30 lb
Krenite	1,000	250 lb	14	35 lb
Atrazine	1,000	4,000 lb	40	1,600 lb
Dalapon	1,000	3,000- 11,000 lb	38	1,140- 4,180 lb
Site Preparation				
(Silvex)		5,000- 15,000 lb		1,300- 3,900 lb
2,4,5-TP	20,000	10,000- 20,000 gal	26	2,600- 5,200 gal
		5,000- 15,000 lb		1,550- 4,650 lb
2,4-D	20,000	10,000- 20,000 gal	31	3,100- 6,200 gal
Roundup	5,000	15,000 lb	17	2,550 lb
Krenite	5,000	15,000 lb	20	3,000 lb
Atrazine	15,000	45,000- 60,000 lb	46	20,700-27,600 lb
Dalapon	5,000	15,000- 55,000 lb	43	6,450-23,650 lb

1/ The top figure refers to the total amount of herbicide in pounds. The lower figure refers to the diesel oil carrier in gallons; if no carrier is listed, the herbicide is applied in a water emulsion.

2/ These estimates are an approximation only; the actual amounts of herbicides entering the soil depend on "The magnitude of the dose and the duration of exposure to microorganisms, the amount of chemical available for uptake by plants, and the potential for movement of herbicide residues into water" (Norris 1971).

well drained Jory silty clay loams that occur in foothills along interior valleys.

As a general rule, compounds that are highly water soluble (Krenite and atrazine) move most rapidly in the soil, while those of low water solubility or those strongly adsorbed by the soil complex move slowly. Also, when considering the potential for leaching, the amount of annual precipitation and the rapidity with which water can move through the soil needs to be assessed.

A possibility of chemicals leaching through the soil profile does exist in shallow, stony, excessively drained soils when applied in late winter or early spring in a high rainfall zone. If these soils occur over impervious or slowly permeable bedrock, the related groundwater supplies and streams could be contaminated.

Phenoxy herbicides, namely 2,4-D and silvex, have been shown to be quickly adsorbed on the soil colloidal complexes, so they would not be available for leaching to any extent but would be rapidly degraded by microbial activity (Newman and Thomas 1949; Norris 1966; Norris 1967; and Bailey et al. 1970). Silvex has a residual half life of less than 8 months while 2,4-D is degraded 85 to 90 percent within 15 days.

The TCDD contaminant in silvex, once in the soil, becomes tightly adsorbed to the clay minerals and organic matter and is not appreciably absorbed by plants. According to Kearny (1976), "The TCDD does not leach downward, but remains localized in the surface soil. The concentration at this time is less than one part in 10 trillion. Microbial degradation then comes into play and decomposes the remaining chemical to basic materials over a period of probably a year or two."

Kozlowski and Kuntz (1973) found that:

> "When Plainfield sand to which atrazine, simazine, or propazine was surface-applied and leached, most of the herbicide remained in the first inch of soil regardless of whether 2, 4, or 8 inches of water were used in leaching. However, some herbicides, especially atrazine, moved downward to a 6-inch depth. With increased amount of leaching more herbicide was translocated out of the first inch of atrazine-treated soil. Such an effect was not as apparent with simazine- or propazine-treated soil. The greater leachability of atrazine was probably related to its greater solubility.
>
> "This study, which demonstrates the difficulty of removing triazine herbicides from upper soil levels even with large amounts of water, emphasizes the dangers of possible persistence and accumulation of triazine herbicides in forest nurseries, even in light sandy soils."

Atrazine is more readily adsorbed on clay soils than on soils with low clay and organic matter content. The downward movement or leaching is limited by adsorption of atrazine to certain soil constituents. Adsorption is not irreversible and desorption often occurs readily, depending on temperature, moisture, pH, and other soil parameters.

Atrazine is not normally found below the upper foot of soil in detectable quantities, even after years of continuous use. Its use is best restricted to clayey textured soils, avoiding areas where excessively drained, shallow, stony soils with little clay or organic matter occur extensively because of the hazard of leaching residues into groundwater supplies.

The residual activity of atrazine in soil at selective rates for specific soil types is such that most rotational crops can be planted 1 year after application, except under an arid or semiarid climate where atrazine persists longer under dry (xeric) and cold (frigid) conditions or conditions not conducive to maximum chemical or biological activity. Plant removal and chemical alteration are factors in dissipation, but microbial action probably accounts for the major breakdown of atrazine in the soil. A range of soil microbes can utilize it as a source of energy and nitrogen, and the effects of atrazine on these and other organisms appear to be small. Broadcast rates needed in some of the more clayey, organic soils of the North Central states result in enough residue carryover, under some conditions, to injure small grains, alfalfa, and soybeans planted 12 months later.

Thiegs (1955) showed that the breakdown of dalapon in soils is due to microbial action. Dalapon was found to decompose most rapidly in warm, moist soils, whereas in cool or dry soils the herbicides remained for extended periods.

Day, Joydan, and Russell (1963) reported on the persistence of dalapon under laboratory conditions in 43 soils collected from California citrus districts. The rates of decomposition of dalapon were highly variable among the soils studied, apparently due to differences in the population of soil microbes capable of decomposing dalapon. Decomposition ranged from complete disappearance in less than 2 weeks to the retention of two-thirds of the added dalapon after 8 weeks. The capacity of the soil to decompose dalapon was essentially random with respect to soil series, texture, cation exchange capacity, total organic matter, and geographic source.

Greenhouse soil disappearance tests with ^{14}C-labeled Krenite indicated a half-life of about 10 days. Under field tests the half-life was about 1 week. Because of rapid degradation, there was little or no downward movement of Krenite or its degradation products (Du Pont 1976), but since this product was quite soluble in water, the amount and intensity of rainfall the first 24 hours following application would be very important. For this reason, the weather forecasts would need to be be closely followed before application was permitted.

Monsanto (1975) reported Roundup was somewhat strongly bound to soil particles and did not leach appreciably. After using a 4 and 8 pounds per acre application rates, it had a residual half-life of less than 2 months at 10 of their 11 test locations.

<u>Cumulative Impacts</u>. The persistence of herbicides in the soil varies with the herbicide used and the type of soil. Half-life times range from less than 4 months to 12 months. No cumulative impacts are expected to result from the use of herbicides as described in Chapter I.

Conclusions. Documented evidence indicates herbicide impacts to soils to be of little significance (Abrahamson and Norris 1976). At application rates normally used for the selected chemicals and incorporating the planned project design features presented in Chapter 1, no significant soil-related impacts would be anticipated. However, a potential for herbicide loss does exist from (1) compacted bare soil areas due to runoff of herbicides in solution or adsorbed to soil particles, and (2) from leaching in shallow, stony, rapidly drained soils.

Soil Organisms

Researchers have found that soil microorganisms are important in the breakdown of herbicides in the soil (Audus 1964). Phenoxy herbicides are very susceptible to soil breakdown (Bollen 1961) and 2,4-D is degradable in forest litter. Recovery of 2,4-D dropped to 6 percent after 35 days in one study (Norris 1970).

Additions of herbicides to soil have a measurable effect on the microbial activity in the soil. It is not clear if this effect is caused by the presence of the herbicides or if the effect is a result of the microbes using the herbicide as an energy source. Only a minute amount of aerially applied herbicide effectively comes in contact with the soil when applied for brush control, particularly when mixed with an oil carrier which facilitates adherence to vegetative cover. In effect only about 3 parts per million will be found in the soil surface for each pound of chemical applied (Norris 1971), although essentially all applied atrazine in a water carrier would make contact with soil. Oxygen consumption of soil organisms in a loamy soil was measured as an indication of the effect of herbicides on the microflora (Whiteside and Alexander 1960). Another study has shown that 2,4-D concentrations up to 10 parts per million did not affect respiration (Ibid.). The effects of 2,4-D on soil-borne actinomycetes were measured and some strains were adversely affected by a concentration of 400 parts per million (Baldacci and Amici 1954). Fungi are apparently more resistant to phenoxy herbicides than bacteria (Stephenson and Mitchell 1945). 2,4-D applied to silt loam soil at rates of 1 to 4 pounds per acre did not have a significant effect on the microorganisms (Kratochvil 1951).

When Krenite was introduced at 4 and 20 parts per million to two soil types in laboratory biometer flask tests to evaluate microbial degradation, the tests showed that carbon-labeled CO_2 accounted for 45 to 75 percent of the original weight of labeled carbon after 90-day incubations.

Cumulative Impacts. Some microorganisms are capable of degrading various herbicides, and thus would prevent accumulations of the herbicide in the soil.

Conclusion. There is no evidence to indicate that the herbicides, applied at the recommended rates, would have significant effects upon soil microbial populations (Bollen 1961; Cullimore 1971).

Fertilization

The forest ecosystem contains a large amount of nutrients tied up in the flora and fauna, the dead and decaying organic matter, and the

soil. Through a very complex process in energy transfer, nutrients are recycled within the forest. This transfer of nutrients within the forest ecosystem is a closed cycle which, if broken at any point, results in a loss of nutrients (Bollen 1974). Nitrogen is the nutrient most susceptible to loss from the forest ecosystem due to its complex interrelationship with soil microbiotic life (Moore et al. 1974). It is also the nutrient most likely to be limiting maximum growth in the forest (Ibid.).

The proposed action would apply 200 pounds of nitrogen per acre. Since it would be applied as urea fertilizer pellets (which are 46 percent nitrogen), 445 pounds of urea per acre would be needed. Over the 10 year period, 1,890 tons of nitrogen would be applied to the 18,900 acres.

The effects of increased nitrogen in the forest ecosystem would be to make the soils more acid, increase the rate of decomposition, and increase the solubility of organic matter. Little is known about the effect of nitrogen on the recycling rates of other nutrients in forest soils. The impact of an increase in the nitrogen content of the forest soil would be to increase the rate of growth of all plants in the ecosystem, including weeds, brush, microbes, and trees (Moore et al. 1974). The impact of fertilization on soil productivity would be of minor significance. It would, however, replace nutrients lost by leaching, and thus be a beneficial impact.

Planting

The impacts of the three planting systems on the soil would be so similar they are considered here as one action.

Reforestation of burned, non-stocked, and poorly stocked areas would reduce long-term erosion losses and improve water infiltration capabilities in areas with poor vegetational cover (USFS 1977b). The loss of soil by erosion would decrease in direct proportion to the increase in canopy cover by growing trees. Raindrops would be intercepted by the thicker canopy cover of the growing trees, reducing spatter erosion and compaction of the surface by raindrops. Raindrops can compact bare soil by the kinetic energy of falling, resulting in a surface layer that reduces infiltration and increases overland flow (Lull 1959).

The planting of tree seedlings would increase soil moisture retention through the dry season (June through September) reducing dry ravelling (downslope movement of soil particles by gravity). The increase in root penetration would increase the stability of soils on steep slopes, lessening mass movement (Burroughs et al. 1976).

By planting the seedlings, mortality due to frost and dessication that is normally expected in germinating seeds on bare soil by natural regeneration would be reduced. As the trees grow, frost and wind exposure of the soil surface would be lessened. Soil temperature extremes would be moderated by the growing trees. The growing seedlings would create their own favorable environment.

The rate of regeneration would be accelerated by the planted seedlings. The increased rate of regrowth would reduce the amount of soil that

would move downslope by erosion. Infiltration would increase and overland flow would decrease on the planted areas (Anderson et al. 1976). This would be a significant, beneficial impact on areas which have previously been understocked.

3.1.4 Water Resources

3.1.4.1 Water Yield

Silvicultural Practices

Shelterwood Harvest

A total of 41,000 acres would be involved in the initial regeneration cut of the proposed action. Another 9,000 acres would receive the final harvest cut. The impacts on water yield would be the same for both practices. Based on studies in western Oregon (Tables 3-8, 3-9), an initial increase in water yield of about 25 percent would be anticipated for the lands harvested by the shelterwood method because of reduced transpiration (Harr 1976a). At present, the average water yield of the JSYU is approximately 2.0 acre feet per acre per year.

Runoff on the 50,000 acres subject to shelterwood harvest would increase approximately 25 percent per acre per year as previously documented (Ibid.), from 2.0 acre feet to 2.5 acre feet per acre per year. Therefore, the anticipated increase in water yield would be 25,000 acre feet per year, in an average water year. (The average water year is assumed to equal the average yield of the Rogue River at Agness, Oregon, during water year 1975, the year closest to the average yield of the past 15 years at that station.) The water yield of 25,000 acre feet per year would decrease at an even linear rate to the undisturbed rate (2.0 acre feet per acre per year) after approximately 5 years, assuming all aspects of the proposed action would be implemented--including fertilizing, herbicide application, and planting). Therefore, the total increased yield for those lands impacted by shelterwood harvest would be approximately 75,000 acre feet. This is a 15 percent average increase over the yield for undisturbed conditions of 500,000 acre feet. By comparison, the increased yield would equal 0.3 percent of the Rogue River runoff at Agness over the same time period (see Figure I-1, Appendix I).

Clearcutting

In the proposed action, clearcutting would occur on 5,000 acres. An increase in water yield of up to 40 percent would be anticipated for the lands subjected to clearcutting (see Tables 3-8, 3-9) (Harr 1976a). Because the areas to be clearcut would be at the higher elevations in the JSYU, they would receive substantially more precipitation than the average of 2.0 acre feet per acre per year of the whole of the JSYU (see Figure 2-3). It is estimated that the present average water yield for these higher elevation areas is 3.0 acre feet per acre per year. A 40 percent increase in the average water yield for clearcut areas means estimated yields of up to 4.2 acre feet per acre per year.

The current average yield of the areas to be clearcut is now an estimated 15,000 acre feet per year. Clearcutting will increase the yield 6,000 acre feet in the first year, to 21,000 acre feet. This would decrease at an even rate, reaching the average yield of 3.00 acre feet per

Table 3-8

Summary of Increases in Annual Water Yield in Western Oregon

Watershed	Code	Size	Cut	Treatment[1/]	Yield Increase		
					Maximum	Avg.	Average increase
		Acres	Percent		cm	cm	percent
Alsea (Needle Branch)	AL-1	175	82	CC-R	62	49	27
Alsea (Deer Creek)	AL-3	749	25	PC-R	15	7	5
H.J. Andrews	HJA-1	237	100	CC	56	38	34
H.J. Andrews	HJA-3	250	33	PC-R	27	18	17
Fox Creek	FC-1	146		PC	--	2/	--
Fox Creek	FC-3	175	75	PC	--	2/	--
Coyote Creek	CC-1	170	30	SW-R	--	2/	--
Coyote Creek	CC-2	168	30	PC-R	9	8[2/]	24
Coyote Creek	CC-3	124	100	CC	37	33	70

1/ CC = clearcut, R = roads, PC = patch cut, SW = shelterwood.

2/ No significant change.

(Harr 1976a)

Table 3-9

Summary of Increases in Annual Yield, Average Peak Flow, and Large Peak Flows in Experimental Watersheds in Western Oregon

Location and watershed	Code	Area	Cut	Severely Compacted 1/	Did increase occur? Annual Yield 2/	Average Peak Flow 2/	Large Peak Flow
		Acres	Percent	Percent			
Alsea (Needle Branch)	AL-1	175	82	5	Yes	Yes	No
Alsea (Deer Creek)	AL-3	749	25	4	Yes	No	No
Alsea (Deer Creek #2) 3/	AL-32	138	30	3	Yes 4/	No	No
Alsea (Deer Creek #3) 3/	AL-33	99	65	12	Yes 4/	Yes	Yes
Alsea (Deer Creek #4) 3/	AL-34	40	90	0	Yes 4/	Yes	No
H.J. Andrews	HJA-1	237	100	0	Yes	Yes	No
H.J. Andrews	HJA-3	250	30	8	Yes	Yes	No
Fox Creek	FC-1	146	25	2	No	Yes	No
Fox Creek	FC-3	175	25	0	No	No	No
Coyote Creek	CC-1	170	30	15	No	Yes	Yes
Coyote Creek	CC-2	168	30	7	Yes	No	No
Coyote Creek	CC-3	124	100	13	Yes	Yes	Yes

1/ Figures here are not directly comparable. Some are for roads and skid trails only: others also include cut-banks and fill-slopes.
2/ Statistically significant increases (a-0.05) in annual yield and average peak flows are indicated.
3/ The Deer Creek watershed was divided into subwatersheds.
4/ Annual yield data are not available, but increases are assumed, based on results of water yield analyses on other Alsea watersheds.

(Harr 1976a)

acre per year after 5 years. Therefore, the total increase in runoff due to clearcutting activities would be approximately 18,000 acre feet, a 24 percent increase in runoff over the yield for undisturbed conditions. The 18,000 acre feet would be 0.07 percent of the Rogue River discharge over 5 years at Agness, Oregon (assuming average flow).

While the localized effects of clearcutting on runoff would be site specific, certain generalizations can be made as to impacts. In undisturbed forest ecosystems, no overland flow occurs; runoff is mainly from subsurface flow in the humus and soil (see Chapter 2, Water Resources). After clearcutting, water movement may occur over the surface of the soil (overland flow), increasing the volume per unit of time flowing to the channels in affected areas. This increases the velocity of streamflow in channels, causing some erosion (Harr 1978, Personal contact). Highest peak flows from logged watersheds are rarely greater than they would have been if no logging occurred since such peak flows are usually the result of rain-on-snow events (Rothacher 1973). Therefore, while some site specific impacts to water yield would occur as a result of clearcutting, most of the impacts would be due to yarding practices and road construction (discussed later in this section).

Commercial Thinning

In the proposed action, 4,700 acres would be commercially thinned. It is assumed that the impacts on water yield due to commercial thinning are the same as for shelterwood harvest, which would mean an increase in water yield of 0.5 acre feet per acre per year, or 2,350 acre feet in the first year for the areas subjected to commercial thinning. This would decrease at an even rate, reaching the undisturbed yield of 2.0 acre feet per acre per year in 5 years. Therefore, the total increase in water yield due to commercial thinning would be 7,050 acre feet, 0.03 percent of the average discharge of the Rogue River at Agness. This is an insignificant increase in water yield.

Yarding and Loading

Tractor Systems

In Table 3-6, the amount of soil disturbance and compaction due to yarding and loading practices has been illustrated. For this analysis, it is assumed that the disturbed areas would yield 10 percent more water than undisturbed lands and that compacted soils would yield 10 percent more water than undisturbed lands.

The annual yield of areas prior to tractor yarding would be 2.5 acre feet per acre per year. A 10 percent increase due to disturbance and compaction would equal 0.25 acre feet per acre per year. The total acreage of soil disturbed and compacted is 26,891 (Table 3-6). Therefore, the increase in annual yield would be 6,723 acre feet in the first year. Because it would decrease at an even rate over 5 years, the total anticipated increase in water yield would be 20,168 acre feet.

Cable Systems

Impacts on water yield would be dependent upon the number of acres disturbed and/or compacted. Under the proposed action, cable systems would disturb 3,968 acres and compact

1,162 acres (Table 3-6), a total of 5,130 acres. The previously defined increase in annual yield of 0.25 acre feet per acre per year would mean an increased annual yield of 1,281 acre feet the first year. This amount would decrease at an even rate over 5 years to background levels. The total increase in annual yield due to cable yarding and loading would be 3,846 acre feet.

Transportation System

Road Construction and Maintenance

As part of the proposed action, 500 miles of permanent road would be constructed, 100 miles of existing road would be reconstructed, and 50 miles of existing road would be surfaced. An average of 8.8 acres of land would be occupied per linear mile of roads and landings. Therefore, the 4,340 acres of road construction in Table 1-1 agree with observations by others (Silen et al. 1953; Dunford 1962 In Anderson et al. 1976). It is assumed that these values would hold true for the whole of the lands subject to road construction on the JSYU over the 10 years of the proposal.

The 500 miles of new road to be constructed would occupy 4,340 acres of previously undisturbed lands. The 100 miles of existing road to be reconstructed occupies 868 acres, and the 50 miles of existing road to be surfaced occupies 434 acres.

The impacts of road construction are the result of minimized infiltration and maximized overland flow from road surfaces.

Construction of 500 miles of new road would increase the runoff from 2.0 acre feet per acre per year (previously defined undisturbed rate for the JSYU) to the maximum yield, which is assumed to be 80 percent of the annual precipitation of 60 inches, or 48 inches (4.0 acre feet per acre per year). The higher value of 60 inches of precipitation is used since the lands subject to timber harvest are in the mountainous uplands with higher rainfall (see Figure 2-3). The amount of runoff from the 4,340 acres would double, from 8,680 acre feet per year to 17,360 acre feet per acre per year. This is an increase of 8,680 acre feet per year. Because these roads would be permanent, the initial impacts would continue as permanent changes.

The annual yield of lands occupied by the 100 miles of road to be reconstructed is presently between the undisturbed yield (2.0 acre feet per acre per year) and the maximum yield (4.0 acre feet per acre per year). Some of the roads have been unused long enough for an organic mat to build up on the surface and reduce yields to nearly undisturbed rates while others are heavily used roads that need to be upgraded to current standards. For this analysis, it is assumed that the average annual yield is a rate halfway between that for undisturbed lands and the maximum yield of permanent roads, or 3.0 acre feet per acre per year. After reconstruction, this rate would change to 4.0 acre feet per acre per year. Therefore, the increase in runoff due to reconstruction of 100 miles of road would be 868 acre feet per year.

The lands occupied by the 50 miles of road to be surfaced presently have an estimated water yield of 3.0 acre feet per year. Surfacing would increase runoff about 20 percent, or

0.6 acre feet per acre per year. Therefore, the increase in runoff due to surfacing of 50 miles of road would be 260 acre feet per year.

The total increase in annual yield due to road construction activities would be 9,808 acre feet per year. This is a 0.2 percent average increase of the Rogue River streamflow as measured at Agness, Oregon.

Conclusion: Impacts on Water Yield from Silvicultural Practices, Yarding and Loading and Transportation Systems.

Impacts of increased water yield as a result of silvicultural practices, yarding and loading, and road building would be insignificant on the Rogue River at Agness, Oregon (0.7 percent increase). Increased water yield would have significant adverse impacts on streambank erosion and channel instability on smaller streams.

Development Practices

Slash Disposal

Slash disposal would involve broadcast burning on 10,000 acres (in which over 70 percent of the surface would be burned), and gross yarding on 30,000 acres (where cull material and debris would be yarded to areas next to roads or machine piled).

The impacts of slash disposal would occur after yarding and loading were completed. Slash disposal would cause approximately 10 percent additional disturbance and compaction in those areas involved, compared to tractor and cable logging.

Annual yield would increase approximately 0.025 acre feet per year on those areas subjected to surface disturbance and compaction from slash disposal. Because slash disposal disturbs or compacts about 30 percent of the total area of treatment, approximately 12,000 acres would be affected by the treatment. Therefore, the increase in annual yield due to slash disposal would be 300 acre feet the first year, decreasing at an even rate over 5 years. The total water yield from slash disposal would equal 900 acre feet. This would have an insignificant impact upon the streams.

Mechanical Scarification

Mechanical crushing of the brush and mixing it with the soil would increase runoff by an additional 5 percent over the 40 percent increase caused by clearcutting. There would be 160 acres treated by mechanical scarification in the proposed action. As has been previously assumed, the average annual yield of the JSYU would be 2.0 acre feet per acre per year. The increase in annual yield would, due to mechanical scarification, be 0.1 acre feet per acre per year, or 16 acre feet the first year (from 160 acres). This would decrease at an even rate to background levels after 5 years. Therefore, the total increase in runoff as a result of mechanical scarification would be 48 acre feet. This would have an insignificant impact upon streams.

Herbicide Treatment

The change in vegetation that would result from the herbicide treatment of the proposed action as described in Chapter 1 should have little impact on water yield. The death or injury of the target foliage

would reduce the transpiration of these target species. Most target species would be injured rather than killed, and the injured root structure would consume less water. Leaf litter on the forest floor would retard evaporation and reduce splash erosion. During the winter, deciduous target species are dormant, and precipitation is higher than the consumptive use of vegetation including the conifers. In the drier months (May through September) the conifers would transpire more water if competition from the deciduous target species was reduced because of herbicide impacts.

Subsurface flow should, on the average, remain unchanged except following rain storms during dry months that cause increased streamflow. The higher streamflow would be the water that exceeds consumptive use.

There could be a minor increase in overland flow of water entering streams. However, overland flow is quite uncommon in western Oregon and makes a minor contribution to streamflow when it does occur. Localized overland flow as a result of herbicide use in the overall basin yield would be negligible.

No detectable change in the quantity of irrigation water would result from the proposed action. The use of herbicides would reduce or stop transpiration of the target species. This, however, would make more water available to the conifers and result in greater loss by evaporation. Essentially the water quantity gained would equal the loss.

Subsurface flow from the proposed treatment areas would increase somewhat during rainy periods as a result of summer herbicide treatment. The decrease in the amount of water used by vegetation would allow soil moisture to remain higher and more rainfall to be translated into streamflow. By winter, however, when soil moisture in a treated area had been recharged, the area would respond nearly the same hydrologically as it did before treatment. Subsurface flow of water in western Oregon is the primary mechanism by which water is transmitted from the soil surface to streams (inferred from Harr 1976b).

Water volume in ponds, reservoirs, and wetlands downstream from proposed treatment areas could increase slightly during the drier summer months. The amount of volume increase would depend on the intensity and duration of the rainstorm increasing streamflow to water bodies and the amount of the watershed treated. These increased volumes generally would be small but are not quantifiable without major studies. Water yield would increase gradually as different areas were sprayed over the 10-year period of proposed treatment. The total increase in water yield would be only a few percent. The injured plants would recover a few years after spraying and the conifers would grow, causing an overall reduction in water yield.

Cumulative Impacts. Some increase of water volume in ponds, reservoirs, and wetlands during the summer months might occur as a result of continued herbicide application in the watershed tributary to them.

Conclusions: Impact on Water Yield from Herbicide Application.

There would be a small but unquantifiable increase in streamflow

and water storage during drier, low-flow months. There is no evidence that herbicides applied at the recommended rates would have adverse effects on water yield.

Planting

Planting trees on bare areas, reclaimed brushlands, and understocked lands would have a significant effect on runoff. Decreases of 10 percent would be anticipated, taking place over 5 years. Because the lands are assumed to be in a somewhat disturbed state prior to planting, the rate of annual yield would be 2.5 acre feet per acre per year on the average. Without planting, the annual yield would be 156,250 acre feet per year, or 781,150 acre feet over the 5-year period. Therefore, a reduction of 78,125 acre feet of runoff would occur as a result of planting 62,500 acres in the JSYU. This would have a slightly significant, beneficial impact upon stream channel stability.

Precommercial Thinning

Precommercial thinning (cutting down some of the small trees in a stand and allowing them to decay in place) would be done on 14,200 acres under the proposed action.

Little is known about the effects of precommercial thinning on the hydrology of the forest ecosystem (U.S. EPA 1976), but because site disturbance is almost nonexistant, only a slight increase in the annual runoff would occur. The immediate acceleration in the rate of growth of the remaining trees would likely offset this increase in runoff within 1 year, so there would be no impact on streams.

Fertilization

The effect of fertilization on water yield would be indirect, increasing evapotranspiration by increased growth and thereby decreasing runoff. Yields were reduced 24 to 28 percent after fertilization of a clearcut area in one reported study (Anderson et al. 1976). It is estimated that a decrease in runoff of up to 10 percent would be directly attributable to the increased vegetation growth that occurred after fertilization with nitrogen.

Fertilization would occur on 18,900 acres as part of the proposed action. Assuming the lands to be fertilized would yield water at the rate of disturbance (2.5 acre feet per acre per year), the decrease in annual yield from these lands would be 10 percent, or 4,725 acre feet. This would be an insignificant impact to streams.

3.1.4.2 Water Quality - Sediment

In the two following sections (Yarding and Loading and Transportation Systems), the impacts of sediment yield on water quality are analyzed. The effects of water acting upon soil are so important in understanding the impacts to be analyzed that a short description of the mechanisms involved is given here.

Mass movement is one form of erosion occurring in the uplands of the JSYU (surface erosion is the other form; see Section 3.1.3 Soils). It is initiated by water moving into the soil and affects stream channels and water quality over long periods of time.

When water enters the soil, the weight of the soil is increased and

its resistance to the pull of gravity is reduced (especially on steeper slopes; see Figure 3-1). In a disturbed forest ecosystem, mass movement in the form of landslides, debris avalanches, and channel scouring can result. The resting place for the soil is usually a stream channel. Movement of soil and debris to the stream channels, occurring as a result of storm events, has an initial impact upon the stream which can continue long after the initial event in the form of channel erosion and increased sediment yield.

The ability of a stream to carry sediment varies with the volume of water and the speed at which it moves. Each year's most severe storm event creates the greatest runoff, which can carry accumulated sediment from terraces and bars in the stream channels. As the water slows, sediment is again deposited on the margins of the stream channel at the high water mark and in new terraces and bars. Severe storm events also cause mass movement of the soil, which has an additional impact on water quality. The sediment yield is a measure of the total amount of soil and rock debris moved by water in stream channels, and thus can be used to measure the impacts of both mass movement and peak flow upon stream quality.

Yarding and Loading

Tractor Methods

In Table 3-6, soil disturbance and compaction that occur as a result of yarding and loading practices is analyzed. In the following discussion it is assumed that the disturbed areas would yield an average of 1.6 times more sediment than undisturbed sites (Megahan 1972 In U.S. EPA 1976). Presently, the amount of suspended sediment in the streams of the planning area as measured in the Rogue River at Agness and in the South Umpqua River at Roseburg equals 3,057 and 4,966 tons per square mile per year respectively (calculated from Tables 2-4, 2-5, 2-6). From this, the weighted average of suspended sediment for the JSYU is estimated as 3,500 tons per square mile per year. This is approximately one-third of the sediment yield (suspended sediment plus bedload, or the total amount of solid matter transported by a stream in an average water year). Therefore, the sediment yield for the JSYU is estimated at 10,000 tons per square mile per year. This is for all lands (including urban, industrial, agricultural, and residential) within the borders of the planning area.

The sediment yield of the areas affected by tractor yarding would be 1.6 times the average of that for the JSYU, or 16,000 tons per square mile per year. This is the same as 25 tons per acre per year. Since 15,669 acres would be disturbed by tractor logging, the total increased sediment yield would be 147,289 tons. The erosion rate would decrease to an undisturbed level over 5 years. Therefore, the increase in sediment yield due to tractor yarding and loading would be 445,847 tons.

Cable Methods

An increase in sediment yield would occur as a result of disturbing the surface of 3,968 acres of land by cable yarding and loading. The sediment yield would be 25 tons per

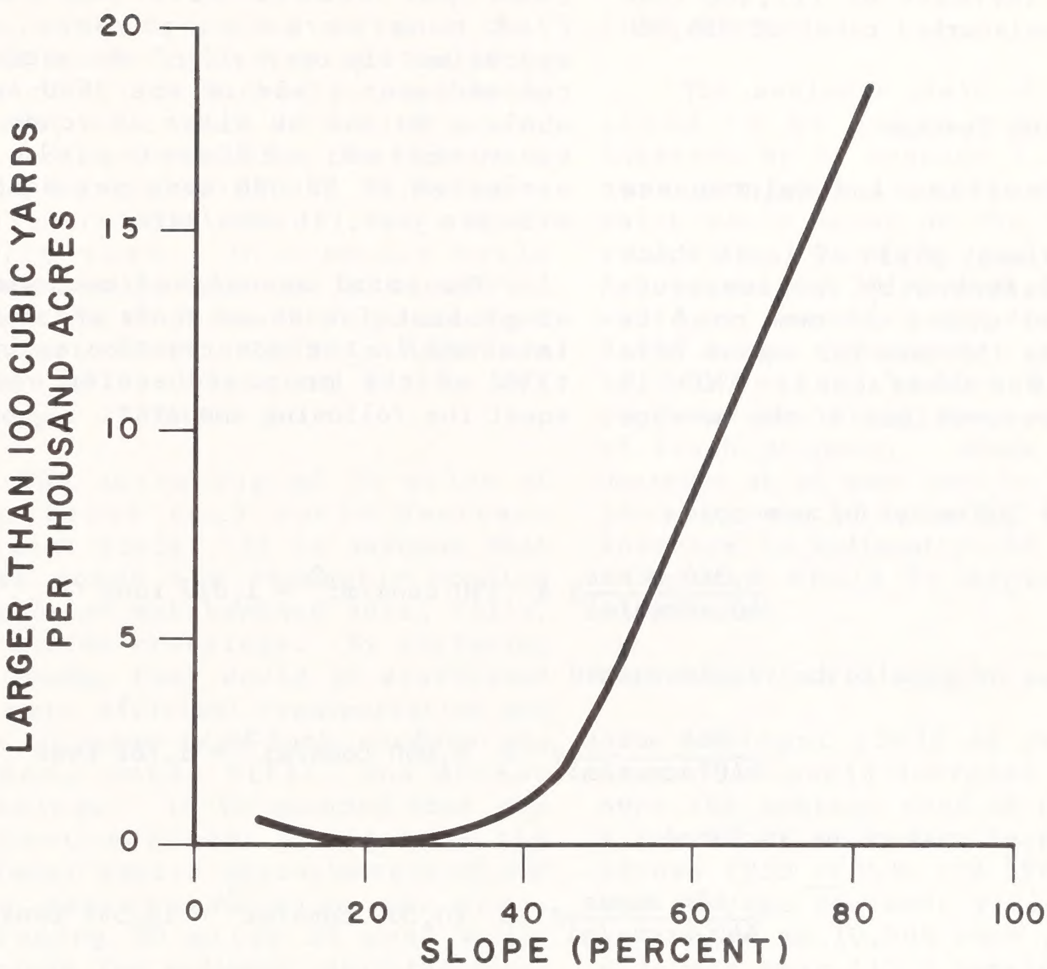


Figure 3-1 RELATIONSHIP OF SLOPE TO LANDSLIDE OCCURRENCE
SOURCE: Fredriksen 1972

acre per year on the disturbed lands. Therefore, the initial increased sediment yield would be 62,000 tons. Since it would decrease to background levels after 5 years, the total sediment yield would be 297,600 tons. This is an increase of 111,600 tons over the undisturbed total of 186,000 tons.

Transportation Systems

Road Construction and Maintenance

Present sediment yield of lands which would be disturbed by the construction of 500 miles of new road is estimated as 150 tons per square mile per year (0.2 tons/acre). This is based on observations of the average sediment yield of other sites in western Oregon (Fredriksen 1970). Sediment yield (from cuts, fills, stream crossings, and surfaces) of 100 miles of roads that would be reconstructed is an estimated 5,000 tons per square mile per year (7.8 tons/acre) at present, or approximately one-half of the estimated sediment yield of the JSYU as a whole. On the 50 miles of roads to be surfaced, sediment yield is estimated at 20,000 tons per square mile per year (31 tons/acre).

The total annual sediment yield at present for those roads and lands involved in the construction activities of the proposed action would equal the following amounts:

land for 500 miles of new road

$$\frac{4{,}340 \text{ acres}}{40 \text{ acres/mi}^2} \text{ X } 150 \text{ tons/mi}^2 = 1{,}017 \text{ tons}$$

100 miles of road to be reconstructed

$$\frac{868 \text{ acres}}{640 \text{ acres/mi}^2} \text{ X } 5{,}000 \text{ tons/mi}^2 = 6{,}781 \text{ tons}$$

50 miles of road to be surfaced

$$\frac{434 \text{ acres}}{640 \text{ acres/mi}^2} \text{ X } 20{,}000 \text{ tons/mi}^2 = 13{,}562 \text{ tons}$$

Road construction activities would increase sediment yield both initially as a result of disturbance and on a long-term basis as stream channels seek equilibrium with the additional sediment. Based upon sediment yields for other sites in western Oregon (Fredriksen 1970; Fredriksen 1965 In Anderson et al. 1976), it is estimated that the initial (first year) sediment yield of the lands subject to 500 miles of new construction would be an average 65,000 tons per square mile per year. Therefore, the sediment yield for the lands subjected to road construction would be 440,781 tons the first year, decreasing at an even rate to reach background sediment yield of 5,000 tons per square mile per year (one-half of the estimated average for the JSYU as a whole) after 5 years.

The reconstruction of 100 miles of existing road would increase sediment yield because of erosion from cut and fill slopes and stream channels. The increase would be approximately one-half that for new road construction, based upon the previously described estimate that roads to be reconstructed would be in a condition midway between being totally disturbed and undisturbed. The sediment yield for the first year would be approximately 33,000 tons per square mile (Ibid.), or a total 44,756 tons. This amount would decrease at an even rate to background levels in 5 years (estimated from Reinhart et al. 1963 In Anderson et al. 1976; DeByle and Packer 1972 In Sopper 1975).

The surfacing of 50 miles of unsurfaced road would decrease sediment yield. It is assumed that these roads are presently eroding because of substandard cuts, fills, and stream crossings. By surfacing the roads, they would be stabilized for more efficient transportation and less erosion from both surface and slopes, cuts, fills, and stream crossings. It is assumed that the present sediment yield from the surfaces equals approximately 20,000 tons per square mile per year. Surfacing 50 miles of road would increase the sediment yield the first year to 65,000 tons per square mile because of preparation of the road for surfacing. This would decrease at an even rate to background levels after 5 years. The amount of erosion that would occur from these roads without surfacing would be 67,812 tons.

Table 3-10 illustrates the sediment yield that would occur as a result of the road construction phase of the proposed action. The yields are compared to those for all BLM-administered lands in the JSYU, all other owned or administered lands, and the JSYU as a whole.

Development and Protection Practices

Slash Disposal

The sediment yield of the 30,000 acres to be gross yarded would increase by an average 2.5 tons per acre per year in addition to that which would occur on the lands as a result of yarding and loading. Approximately 30 percent of the area would be compacted and disturbed, or 9,000 acres. Therefore, an estimated 22,500 tons of sediment would be produced the first year as a result of slash disposal. Since this would decrease at an even rate to background levels over 5 years, the total increase in sediment yield from slash disposal would be approximately 67,500 tons.

Mechanical Scarification

Sediment yield on areas to be scarified would increase 100 times over the average rate of the JSYU as a result of mechanical scarification (Brown 1960 In U.S. EPA 1976). Since the average sediment yield has been estimated as 10,000 tons per square mile per year (15.6 tons/acre/year), the yield for 160 acres subjected to mechanical scarification would be 250,000 tons the first year. This would decrease at an even rate over 5 years to background levels. Therefore, the total increase in sediment yield due to mechanical scarification would be 750,000 tons.

Herbicide Treatment

Stewart (1976) has pointed out that since herbicides by themselves

Table 3-10

Sediment Yield from Road Construction on the JSYU

Construction Phase	1st Year Yield	Total Yield (5 years after construction)
500 miles new road	440,781 tons	1,322,343 tons
100 miles reconstruction	44,756 tons	134,268 tons
50 miles surfacing	30,516 tons	71,204 tons
Total	516,053 tons	1,527,815 tons
Percent of all sediment from BLM-administered lands	7.7%	4.6%
Percent of all sediment from other lands in JSYU	8.5%	5.0%
Percent of all sediment from JSYU as a whole	3.9%	2.3%
Compared to present sediment yield from roads (tons and percent change)	701,922 tons (-26%)1/	2,050,673 tons (-25%)

1/ Negative percentage is the estimated decrease from the existing situation under proposed road construction plans.

do not remove litter layers, stems, branches, or roots, they have less effect on soil erosion than other alternatives such as mechanical scarification. He adds that herbicides do not affect all plant species equally, so accelerated erosion is unlikely and aerial spraying should have little effect on soil losses and related long-term productivity.

Conclusion: Impact of Proposed Action on Sediment Yield

Sediment yield as a result of the proposed action would be increased 2.4 percent over the present yield. This increase would have an impact of minor significance to the whole of the JSYU but could adversely impact water quality significantly in localized areas, particularly small streams.

3.1.4.3 Water Quality - Chemicals

Silvicultural Practices

Shelterwood Harvest

The quality of runoff water from lands harvested by shelterwood methods would be affected by the release of nutrients in the soil (see Section 2.1.1.3, Soils). Most susceptible of the nutrients to cycling disturbance is nitrogen. An estimated 2.45 pounds per acre would enter the runoff from the JSYU over a 4-year period following shelterwood harvest (calculated from U.S. EPA 1976; DeByle and Packer 1972 In Sopper 1975).

$$0.39\ \frac{kg}{ha} - 0.21\ \frac{kg}{ha} = 0.18\ \frac{kg}{ha}$$

$$\frac{0.18\ \frac{kg}{ha}}{1.12\ \frac{kg/ha}{lb/ac}} = 0.16\ \frac{lb}{acre}$$

The 50,000 acres that would be harvested by the shelterwood method would release 8,000 pounds of nitrogen in the first year to streams in the JSYU. This would decrease at an even linear rate to background levels after 4 years (DeByle and Packer 1972 In Sopper 1975). Therefore, the total increase in nitrogen entering the runoff water of the JSYU over the period would equal 20,000 pounds.

The average concentration of nitrogen in the Rogue River for the average 1975 water year was 0.79 ppm (calculated from Table 2-7). The average nitrogen concentration would be increased 0.00000006 percent, an insignificant amount.

The other elements of concern (phosphorus, potassium, calcium and magnesium) would not increase in the total runoff from the JSYU to any significant extent. The total loss from the top 5 inches of soil over 4 years would be approximately 0.5 percent of the phosphorus, 1.1 percent of the potassium, 1.5 percent of the magnesium, and 0.6 percent of the calcium over 4 years. These losses would occur when the mineralized elements were leached out of the soil. Since most of the runoff in the JSYU is from subsurface flow, water moves directly from the soil into the streams; see Section 2.1.1.4, Water Resources (DeByle and Packer 1972 In Sopper 1975).

Clearcutting

The release of nutrients from the soil after clearcutting would have a slight impact upon the overall quality of the runoff water. Nitrogen is the element of most concern since it is very mobile and may cause eutrophication of water bodies (Tarrant et al. 1969 In Anderson

et al. 1976). The same amount of nitrogen released as a result of shelterwood harvest (0.16 pounds per acre) would be released as a result of clearcutting. An estimated 80 pounds of nitrogen would be released to streams the first year, decreasing at an even rate to background levels after 4 years. Therefore, a total of 2,000 pounds of nitrogen would be released in runoff water due to clearing. This is about 0.4 pounds of nitrogen lost from each acre clearcut. The natural discharge of nitrogen from forested systems would be approximately 16 pounds per acre over the same 4-year period (Cole et al. 1967 In Moore et al. 1974 In Cramer 1974). Therefore, the increase of nitrogen would be about 3 percent as a result of clearcutting. Dilution effects of the surrounding land, however, would reduce this amount an estimated 0.000000018 percent of the total nitrogen in the Rogue River at Agness, Oregon, an insignificant amount. Nitrogen losses from the JSYU would be of minor short-term significance for both terrestrial and aquatic ecosystems (Brown 1972 In Anderson et al. 1976; U.S. EPA 1977a).

The losses of other elements of concern would not be significant, since they would be the same as losses from shelterwood harvest.

Commercial Thinning

The increase of nitrogen and other nutrients in the runoff water of the JSYU due to commercial thinning would be insignificant (Brown 1972 In Anderson et al. 1976; U.S. EPA 1977a).

Yarding and Loading Practices

Tractor and Cable Methods

The increase in nitrogen and other chemicals as a result of yarding and loading practices would vary in direct proportion to increases in sediment yield. Again, impacts would be site specific, so quantification is not possible at this level.

Transportation System

Road Construction and Maintenance

The impacts on water quality as a result of road construction activities would be an increase in the concentration of several constituents and a change in some properties (see Section 2.1.1.4, Water Resources). The constituents that would increase are nitrogen and other chemicals, while the properties that would change are temperature, biological oxygen demand, and chemical oxygen demand.

Impacts on water quality due to the increases and changes as a result of silvicultural practices, yarding and loading, and road construction and maintenance would be site specific in the streams immediately downslope of construction activities. The intensity of diverse impacts would vary with the degree of disturbance to lands upslope and to stream channels and in direct proportion to increases in sediment yield. The major impact would be nutrient enrichment.

Development and Protection Practices

Herbicide Site Preparation

Most of the following information and discussion of the

specific herbicides was taken from the U.S. Forest Service Final Environmental Statement, Vegetative Management with Herbicides (Region 6, 1978).

Herbicides may enter forest streams through three possible routes: (1) subsurface flow (leaching); (2) overland flow; and (3) direct application and drift.

Subsurface Flow. Leaching is a relatively slow process which would be unlikely to contribute significant residues to forest streams. Herbicides are mobile in soil, but in absolute terms this mobility is quite limited. There is a sharply decreasing concentration in the soil profile with increasing depth as a result of limited leaching. In terms of the distances involved from treated areas to streams the leaching distance for virtually all herbicides in forest soil is minor. Forest stream monitoring for several herbicides over extended periods of time has consistently shown that leaching of herbicides in forest soils in Oregon has not resulted in detectable (more than 0.001 parts per million) concentrations of herbicide in forest streams (Abrahamson and Norris 1976). Recent research, however, indicates that movement of detectable amounts of herbicides to streams could occur if there was appreciable precipitation shortly after application (Barnett et al. 1967).

Herbicides would have little chance of reaching groundwater aquifers because of rapid degradation and resistance to leaching. Detectable concentrations of persistent herbicides may be present in areas of high water tables such as marshes if herbicides are applied on or adjacent to them. Abrahamson and Norris (1976) have further discussed herbicide entry.

Overland Flow. Overland flow of herbicides would occur only if overland flow of water occurred. Hydrologists report that overland flow of water is quite uncommon on nearly all western forest lands since the infiltration capacity of forest lands far exceeds intense rates of precipitation.

Field testing on forest lands has verified that overland flow of herbicide is restricted to localized events involving bare, compacted, or water repellent soils and litter immediately adjacent to streams. These areas can usually be avoided during application. Overland flow has shown marked reduction in herbicide concentration in water as it moves over uncontaminated soil that adsorbs the chemicals.

Direct Application and Drift. Direct application (by spraying of unintended areas [pilot error], spraying of previously detected pools and intermittent streams, or accidental spills) and drift of spray materials are the principal routes of entry to forest streams (Figures 3-2, 3-3). This is a physical process, which can be markedly influenced by man. Herbicide concentrations in forest streams which are in or adjacent to treated areas range from nondetectable limits (less than 0.001 parts per million), to a maximum of one part per million, with more than 99 percent of all values less than 0.01 ppm even when no particular effort is made to avoid direct application to stream surface with either ground or serial application methods. Research has shown that the location of forest treatment units with a buffer strip along

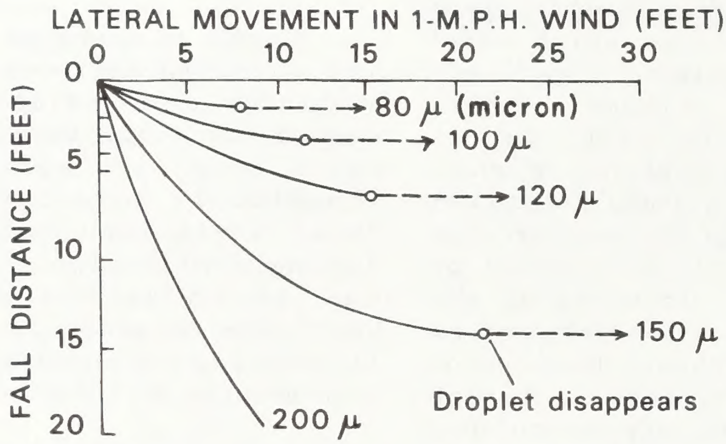


Figure 1.--Relation of vertical fall through air to lateral movement for water droplets falling at terminal velocity in a 1-mph wind. Calculated for 25° C., 50 percent RH, 760 mm Hg, and lateral air movement. (Adapted from "Pesticidal Formulations Research," with permission of The American Chemical Society (Seymour 1969).)

Figure 3-2 LATERAL MOVEMENT OF HERBICIDES
SOURCE: Gratkowski 1974

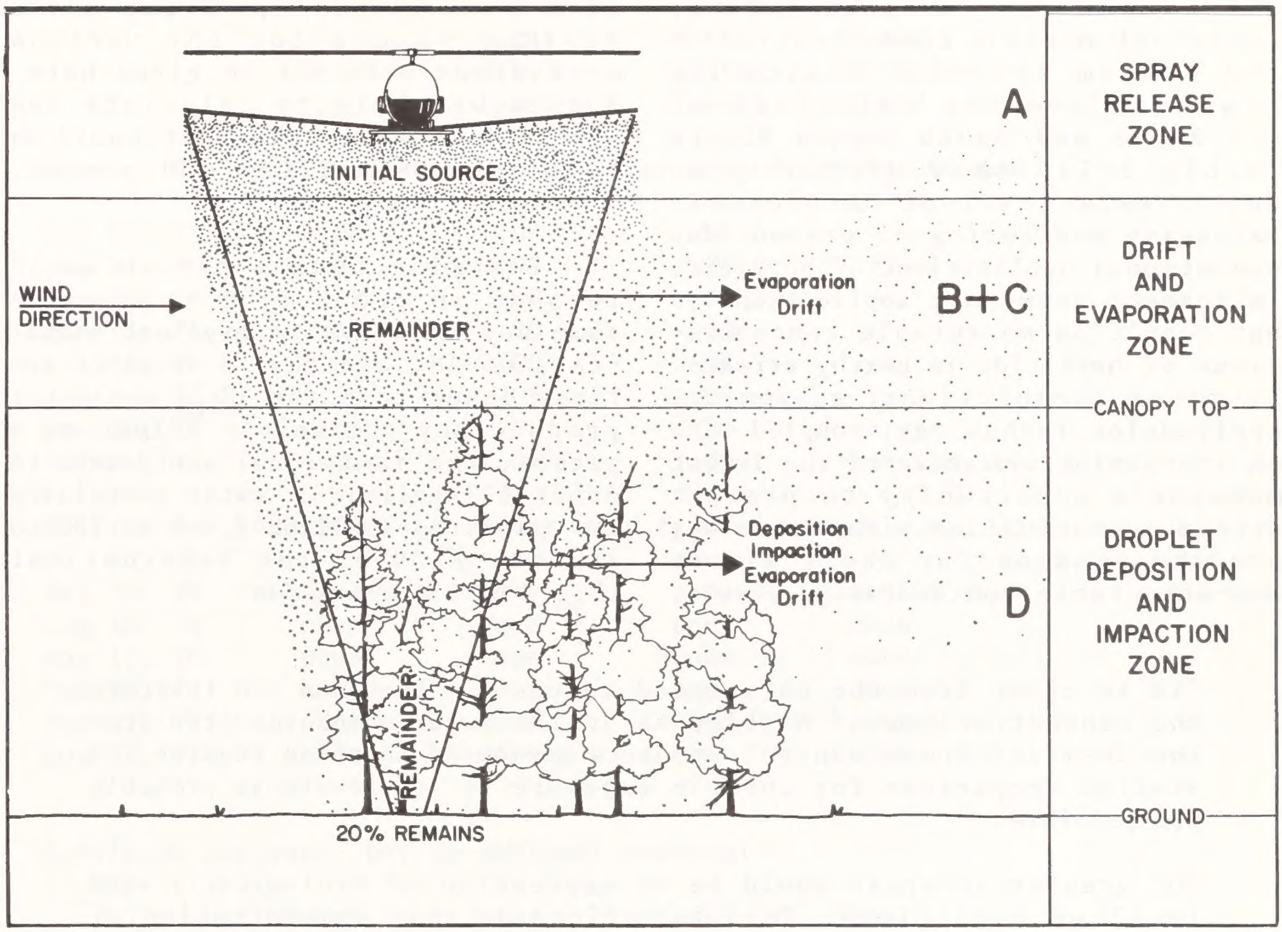


Figure 3-3 METHOD OF AERIAL APPLICATION OF HERBICIDES
SOURCE: Ekblad 1976 in Baker et al. 1976

the streams reduced herbicide concentrations in streams to less than 0.01 part per million with residues detected for less than 1 day after application (Abrahamson and Norris 1976). These measurements were made immediately downstream from treatment unit boundaries and, therefore, represent maximum concentration in the stream system. Monitoring results from the mainstems of the Rogue and South Umpqua Rivers (Table 3-11) show virtually no detectable level of herbicides. Extensive monitoring of present-day operational applications of herbicide in forests show most applications do not result in measurable concentrations of herbicide in nearby streams. Improved formulations, equipment, application technology, coupled with an increasing awareness of the forest manager's opportunity to prevent stream contamination with herbicides are the reasons for these almost non-detectable contamination levels.

2,4-D. Norris (1967) analyzed four 2,4-D treatment areas representing watersheds with different hydrologic characteristics. Streams within the watersheds were sampled for 2,4-D residues at various locations and times following application of 2 to 3 pounds 2,4-D per acre. Residue values for the various watersheds will not be given here. Norris was able to calculate the level of water intake that could be tolerated by a 150-pound person.

Assuming that a person would respond in proportion to size the same way as a laboratory test animal (rat) would, and that a level of 100 times lower than the LD_{50} would not produce any noticeable effect on a person, the individual would need to drink 671 gallons of water containing 100 parts per billion 2,4-D at 100 to ingest 1/100 of the hypothetical LD_{50}. Norris concludes:

"It is clear from the calculated values ... that man can tolerate the concentrations of herbicides in the water which resulted from the chemical brush control projects monitored in these studies. A similar comparison for chronic exposure to low levels is probably not possible.

"Of greater interest would be an expression of biologically safe level of herbicide. This is defined as that concentration of herbicide which could be tolerated for extended periods of time by nearly all members of the food chain with little or no apparent damage. On the basis of the data ... and on the experience of the Ohio River Sanitation Commission, this level might be conservatively set at 100 parts per billion for the herbicides investigated in this program." (Bond et al. 1959).

Silvex. Little specific information on residues of silvex in a forest environment is available. However, silvex itself is less toxic than 2,4,5-T. Both are closely related compounds and both contain the contaminant TCDD. The behavior in the environment would be expected to equal that of 2,4,5-T.

Bailey et al. (1970) studied the movement and persistence of silvex

Table 3-11

Results of Herbicide Monitoring in South Umpqua and Rogue Rivers

Herbicide Analyses, integrated flow

	Total 2,4-D (ppb)[1/]	Total 2,4,5-T (ppb)	Total Silvex (ppb)	Total Atrazine (ppb)
Station No. 14312260 South Umpqua River near Roseburg, Oregon				
Oct 22, 75	.00	.00	.01	--
Jan 22, 76	.00	.00	.00	--
Apr 16, 76	.00	.00	.00	--
Jul 22, 76	.01	.00	.00	--
Oct 20, 76	.00	.00	.00	--
Jan 6, 77	.00	.09	.00	--
Apr 20, 77	.00	.00	.00	--
Jul 26, 77	.05	.04	.00	--
Station No. 14372300 Rogue River Near Agness, Oregon				
May 20, 76	none[2/]	none	none	none
Aug 18, 76	none	none	none	none
Nov 17, 76	none	none	none	none
Feb 24, 77	none	none	none	none
May 17, 77	none	none	none	none
Aug 24, 77	none	none	none	none

Herbicide Analyses, bottom sediment material

	Total 2,4-D (µg/kg)	Total 2,4,5-T (µg/kg)	Total Silvex (µg/kg)	Total Atrazine (µg/kg)	Total Simazine (µg/kg)
Station No. 14372300 Rogue River Near Agness, Oregon					
May 20, 76	none	none	none	none	none

1/ The source (USGS) reported these values in micrograms per liter (µg/l) rather than parts per billion (ppb). The two values are essentially the same at these small concentrations.

2/ None signifies specifically looked for but not detected.

Source: Computer printout from the USGS "WATSTORE" system for western Oregon.

in water and sediment under impounded conditions. Application of the PGBE ester of silvex was made at the rate of 9 kilograms per hectare. Samples were taken 4, 12, 24, and 48 hours after treatment and analyzed for the presence of the PGBE ester of silvex. Although the concentration of silvex initially increased in water, by the end of 3 weeks the concentration had decreased to zero. Silvex and the PGBE ester of silvex apparently was adsorbed by sediment particles. However, there was "essentially complete disappearance" of both at the end of 5 weeks. A 9 kilograms per hectare dosage is a considerably greater dosage than would be applied to a forest site or would be expected to enter a forest stream (based on a conversion rate of 1 pound per acre is equal to 1.12 kilograms per hectare, and the usual application rate of 2 to 4 pounds silvex per acre).

Concentrations of 2,4-D were determined in irrigation water following ditch bank applications for weed control. Applications of 1.9 to 3 pounds 2,4-D per acre produced maximum concentrations of 0.025 to 0.061 parts per million. Reduction of herbicide levels appeared to be due to dilution as the water flowed downstream. Rates of reduction in herbicide levels showed that negligible concentrations would remain after water traveled a distance of 20 to 25 miles. The low concentration of herbicides observed in the irrigation water would likely not be hazardous to crops or to animals (Frank et al. 1970).

Phenoxy chemicals entering water may be lost by volatilization, absorption by organisms, by degradation, and/or by dilution as additional streamflow passes through the site. This latter function is by far the most important. Almost all authorities agree that there is adsorption on bottom sediments (Bailey et al. 1970; Frank et al. 1967). This contamination of bottom sediments, however, does not appear to last long. Biological degradation would be the primary means by which herbicides would be removed from streams as environmental contaminates (Norris 1967). Rapid degradation of phenoxy herbicides would occur in water, especially in bodies of water with histories of repeated applications of phenoxy herbicides. Rapid degradation of 2,4-D has been observed in water samples collected from areas with a history of repeated 2,4-D applications (Goerlitz and Lamar 1967). Concentrations of low volatile esters of silvex in water after application on the surface of three ponds decreased to nondetectable limits by the end of 3 weeks (Bailey et al. 1970).

Only small amounts of herbicide would be likely to enter streams by washing action of rain from overhanging treated vegetation above a stream or from leaves falling into water (Norris et al. 1970). Observations indicate that heavy fall rains would not leach detectable amounts of phenoxy herbicides through the soil into streams if the herbicides have been applied during the spring or very early summer. The phenoxy herbicides move through the soil only in very small amounts and for very short distances. During 6 years of monitoring spray operations in western Oregon, scientists have never found phenoxy residues exceeding 0.1 milligram in western Oregon streams. Although roots of treated plants are the source of small amounts of phenoxy herbicides, this also would be a negligible source of contamination.

A field test was carried out in a fast-flowing stream which provided maximal opportunity for dilution and interchange of water. Residues of silvex were not detected except during the first few hours following treatment. The maximum level found in this study was 0.05 parts per million (Frank et al. 1970).

Erosion could transport these herbicides in soil particles to water courses, especially if the erosion occurred immediately after application.

TCDD. Earlier reports of laboratory data (Kearny 1976) indicated that pure TCDD on soil surface could not be degraded by sunlight. Crosby and Wong (1977) have demonstrated that TCDD, as it actually occurs in formulated herbicide products, is rapidly degraded (about 15 percent in 6 hours) on the soil surface by the action of sunlight.

Only trace amounts of TCDD are taken up by plants after exposure to levels of TCDD containing 40,000 times the concentration expected from the application of brush control chemicals (Tschirley 1971). TCDD on leaves is lost by photodegration in a single day (Crosby et al. 1977).

In five soils with widely varying characteristics, TCDD was found to be immobile, even when subjected to leaching (Helling 1973). The possibility of TCDD entering groundwater would be remote (Tschirley 1971).

TCDD is nearly insoluble in water - 0.2 parts per billion (Dow Chemical Company 1970). For this reason, it would be expected to remain on the surface of plants and soil at the application site. Previously cited references indicate that TCDD would not leach in soils. Because it is immobile in soils, Kearney et al. (1973) concluded that there would be "no groundwater contamination problems." In the natural environment, any TCDD would be expected to be found associated with other constituents of the formulation which are less soluble in water. They would form a thin film on water surfaces. Such films are expected to be degraded by sunlight, much like thin films on vegetation or the soil surface. Residues might, therefore, be substantially less than would be indicated from research with pure laboratory systems, suggesting that TCDD would be only slowly degraded in water (Kearney 1973). TCDD could be transported in oil particles by erosion.

Atrazine. In the study by Kozlowski and Kuntz (1973) (see Section 3.1.3.4), atrazine was found to leach downward more readily than other triazine herbicides in sandy soils. Atrazine is more readily adsorbed on muck or clay soils than on soils with low clay and organic matter content. The depth to which it would be leached is limited by its adsorption to certain soil constituents. Adsorption is not irreversible and desorption may occur readily, Atrazine is not normally found below the upper foot of soil in detectable quantities, even after years of continuous use.

The residual activity of atrazine in soil at selective rates for specific soil types is such that most rotational crops can be planted 1 year after applications, except under an arid or semi-arid climate. Atrazine, however, may persist longer under dry and cold conditions or

conditions not conducive to maximum chemical or biological activity. Broadcast rates needed in some of the heavier, organic soils of the North Central states result in enough residue carryover, under some conditions, to injure small grains, alfalfa, and soybeans planted 12 months later. Plant removal and chemical alteration are also factors in dissipation.

Dalapon. Dalapon breaks down rapidly in soil, hydrolyzes slowly in water, but is persistent in plants. Thiegs (1955) showed that the breakdown of dalapon in soils is due to microbial action. It was found to decompose most rapidly in warm, moist soils, whereas in cool or dry soils the herbicide remained for extended periods.

Dalapon is apparently more persistent in water than in soil. Oxygen levels are lower and microbial populations are therefore different. Anaerobic species are favored in aquatic environments, whereas aerobes usually predominate in agriculture soils, particularly in the subsurface soil layer. Most microorganisms that effectively decompose herbicides are aerobic (National Academy of Sciences 1968). Warren (1964) reported that dalapon would hydrolize slowly, depending upon temperature, unless some microorganisms were present.

Frank, Demint, and Comes (1970) provided data concerning the concentration and persistence of dalapon in irrigation water following tests on canal-bank treatments for weed control. On the canal where dalapon was sprayed directly on the water surface to provide a concentration of 100 parts per billion at the application site, it was calculated that the residue level would approach zero 20 miles downstream.

Frank, Demint, and Comes (1970) concluded that dissipation of those freely water-soluble herbicides not extensively absorbed from water solutions would be affected principally by dilution. They also concluded that it was unlikely that illegal residues would be contained in crops irrigated with water containing the concentration of dalapon found in their study.

Krenite. Krenite is soluble in water but readily adsorbed by soil particles. Therefore, it does not have the potential to run off into surface waters or leach into subterranian aquifers. It has a Freundlick K equilibrium constant on Keypart silt loam greater than 20, indicating a high adsorbtion to the soil (DuPont 1976).

Roundup. Roundup (Glyphosate) is a white solid having a water solubility of 10,000 parts per million. The compound has negligible volatility. Round-up is rapidly inactivated upon contact with soil, so that there would be little or no residual activity. It appears to be well translocated to roots following foliar absorption. Since it is quite water soluble, and inactive in the soil, precipitation soon after application will greatly reduce its effectiveness.

Cumulative Impacts of Herbicide Application on Water Quality

Cumulative impacts would not be expected to occur, as indicated in Table 3-12, under the relative persistence column.

Conclusions

1. Available information indicates that although some phenoxy herbicides may enter streams flowing

Table 3-12

Summary of Herbicide Characteristics Used In Forestry

Herbicide	Formulation	Season of Application	Carrier and Volume	Application Rate	Selectivity	Relative Persistence	Use Precautions	Route of uptake	Cost ($/lb or $/gal)
2,4-D	Amine	Spring and summer	None	Undiluted or 1:1 with water 4 lb ai/A	Hardwoods except cherry and bigleaf maple by injection	Short	LD_{50}-375 mg/kg	Cut surface	$6.50 gal. at 4 lb ae/gal.
	Low volatile esters (isooctyl, BOE, PGBE)	Late winter to summer	5-20 gal/A in diesel, water or oil-in-water	1/4-3/4 gal/A 1/3 bl ae/A	Shrubs, weed trees and forbs: for site preparation and conifer release (except pines)	Short		Stem & foliage	$8/gal at 4 lb ae/gal.
	Amine	Spring to late summer	None	Undiluted or 1:1 with water	Hardwoods by injection	Short		Cut Surface	$19/gal at 4 lb ae/gal
Silvex	Low-volatile esters (BOE, PGBE)	Late winter to summer	10 gal/A in diesel, water, or oil-in-water emulsion	1/4 to 3/4 gal/A 1-3 lbs ai/A	Shrubs, weed trees & forbs: slightly more damaging to conifers than 2,4-D or 2,4,5-T	Mod.	Silvex is not a direct substitute for 2,4,5-T LD_{50}-375 mg/kg	Stem & foliage	$18/gal at 4 lb ae/gal
Dalapon	74% sodium and magnesium salts-water soluble	Late winter to early spring after grasses emerge	5 to 10 gal/A areal: 10 to 100 gal/A ground in water	3 to 11 lb ai/A	Annual and perenial grasses for site preparation use with atrazine or directed sprays for release	Short	Use 1/2 to 4 pints surfactant per 100 gal; delay planting 2 weeks if rate over 8 lb.; apply when grasses are actively growing; LD_{50}-6500 mg/kg	Foliage & root	$1.96/lb.
Atrazine	80% wettable powder	Late winter	10 gal/A in water	3 to 4 lb ai/A	Annual grasses and some forbs; does not damage conifers when properly applied	Short	Requires at least 2 inches of rain after application; LD_{50}-3080 mg/kg	Root	$2.80/lb

Table 3-12 (Concluded)

Herbicide	Formulation	Season of Application	Carrier and Volume	Application Rate	Selectivity	Relative Persistence	Use Precautions	Route of uptake	Cost ($/lb or $/gal)
Krenite AECP (Ammonuim ethyl carbamoylphosphonate)	Krenite-water soluble liquid	Late summer to early fall	10-40 gal/A aerial: 50-300 gal/A ground in water	1-1/2 to 3 gal/A 6 to 12 lbs ai/A	Deciduous species for site preparation	Short	Applied in 2 month period before fall leaf coloration; LD_{50}-24,000 mg/kg	Foliage	$32/gal
Roundup	Water soluble	spring, fall	10 gal/A in water	1 qt. to 1 gal.	Deciduous trees, shrubs, weeds	Short	Apply only to undisturbed areas	Roots	$50-$60/gal.

Short = 1/2 life 4 months: moderate = 1/2 life 5-8 months; long = 1/2 life 8-12 months.
ae = acid equivalent: ai = active ingredient.
Season of application may vary depending upon local conditions.

through or adjacent to areas being sprayed, the levels in the streams would be very low. In 6 years of monitoring spray operations in western Oregon, scientists have never found phenoxy residues exceeding 0.1 parts per million in western Oregon streams.

2. Long-term low-level pollution would be found if phenoxy herbicides were applied directly on marshy areas (USDA Forest Service 1974).

3. Potential exists for contamination of water due to the erosion of soil particles containing herbicides or TCDD (the contaminate in silvex).

4. Nearly all of the herbicides found in streams were introduced by direct application of spray materials to the surface of the water.

5. The length of persistence (usually a few hours, but up to a few days) is a function of the hydrologic nature of the area treated.

6. Groundwater supplies would essentially not be impacted unless sprayed on or near wetlands (areas with high water table).

7. Some herbicide traces (a few parts per billion) could appear for a short period in nearly all streams which flow immediately adjacent or through treatment areas.

Planting

Water quality would change with time as the planted seedlings grow into trees. The concentration of nitrogen in runoff, as well as other elements, would decrease as nutrient cycles re-established themselves. Some properties would also be affected. Temperature would go down in streams as shading increased, and dissolved oxygen would increase as the temperature declined. Quantification is not possible at this time because the exact areas to be planted are not known. Impacts to water quality, while beneficial on a site-specific scale, would not be significant over the entire JSYU.

Fertilization

Fertilization would likely increase nitrogen concentration in streams. The typical reaction of a watershed to fertilization would be an urea concentration peak in the runoff water within a few hours of fertilizer application. Following this peak (over a period of a few days), there would be a smaller ammonia peak, and a few days later, a smaller nitrate peak. The nitrogen from the fertilizer application would fall to background levels after a few weeks. Most of the fertilizer loss would occur from November through January (Fredriksen et al. 1973) in runoff. Levels of nitrogen in streams draining one watershed in southwest Oregon that had been fertilized with nitrogen have not exceeded Federal public health standards as a result of fertilizer application alone (Ibid.). Table 3-13 illustrates the results of nitrogen level investigations following fertilization projects in western Oregon and Washington. Impacts to the water quality of streams of the JSYU would exhibit similar responses as observed in the studies in Table 3-13. Quantification, however, is not possible since dilution factors, time of application, and the total annual yield for the water year involved in such calculations all

Table 3-13

Characteristics of Western Oregon and Washington Streams Following Early Spring Fertilization

Location	Stand type and age	Area treated[1/] (ha)	Percent of watershed treated	Mean annual rainfall (cm)	Mean pretreatment concentration (mg/l)			Peak post-treatment concentration (mg/l)		
					Urea-N	NH_3-N	NO_3-N	Urea-N	NH_3-N	NO_3-N
Coyote Creek, Umpqua NF	Mixed conifers, old growth	68	100	120	.006	.005	.002	1.390	.048	.177
Trapper Creek Olympic NF	Douglas-fir 40 years	64	< 10	102	.008	0	.034	.700	.010	.121
Jimmy-come-lately Creek Olympic NF	Douglas-fir 10 years	49	< 10	115	.002	0	.005	.708	.040	.042
Nelson Creek Siuslaw drainage	Douglas-fir young growth	38	100	153	.02	.01	.290	8.60	.32	2.10
Dollar Creek McKenzie drainage	Douglas-fir young growth	34	100	140	.02	.03	.060	44.40	.49	.13
Pat Creek Yamhill drainage	Douglas-fir 35 years	243	63	190	.003	.007	.070	3.26	.034	.388

1/ All units were fertilized with urea at 224 kgN/ha in March or April of 1970, 1971, or 1972.

Fredriksen et al. 1973

vary. Impacts on water quality would not be expected to be significant.

Precommercial Thinning

The increased rate of growth following thinning and the lack of any surface disturbance as a result of this management practice would preclude any significant effects on water quality as a result of precommercial thinning.

3.1.4.3 Summary of Impacts on Water Resources

A summary of the impacts on water resources of the JSYU as a result of the proposed action is found in Table 3-14. This is a summary only, and does not replace the information contained in the text.

While no data exist about the downstream impacts on water and fisheries resources in the JSYU as a result of the combined land management activities of other agencies, some insights can be gained by analyzing Table 1-14 for the Rogue River Basin. It is assumed for this analysis that land management on U.S. Forest Service, State, county, and private forest lands will not change from present practices.

The totals for the Rogue River Basin in Table 3-15 represent all additional sediment, water yield, and nitrogen added to the watershed as a result of man's activities in the area. They are in addition to the sediment, water, and nitrogen added as a result of natural processes (the natural base). The additions from Forest Service, State, county, and private lands are remaining fairly constant (see earlier discussion) because their management policies are assumed to be the same. Therefore, the sediment, runoff, and nitrogen added as a result of the proposed action would be the factors which affect the watershed. It should be noted the proposed action represents a drop in the allowable cut, so there would actually be a drop in the man-caused additions to the "natural base."

3.2 BIOLOGICAL ENVIRONMENT

The major vegetational impacts of the proposed action center around the removal of approximately 24 percent of the old growth forest community from commercial forest lands in the JSYU and the associated replacement of the old growth community with early seral stage communities. As a result, an estimated 275 percent increase over currently existing acreages in early successional stages is anticipated. Conversion of early successional communities to conifer-dominated later stages would be facilitated by planting, herbicide application, fertilization and other forest development practices. These practices would abbreviate the residence times of earlier successional stages, which naturally follow logging activities, thereby precluding maximum seral community stratification. Road construction supportive to timber management would remove approximately 4,340 acres from vegetative production for the life of the roadways.

The major impacts to terrestrial wildlife populations are associated with vegetational alterations and soil disturbance. The proposed action would contribute to an estimated 275 percent increase in early seral stage habitat via the elimination of approximately 24 percent of existing old growth and 18 percent of existing mature forest

Table 3-14

Summary of Water Resources Impacts
(NOTE: This table is for summary and comparison only; it is not intended to replace derivitive narrative)

	Water Yield (compared to WY 1975)			Water Quality					
Management Treatment	Annual Yield	Average Peak Flow	Large Peak Flow	Total Nitrogen	Other Chemicals	Sediment Yield	Tempera-ture	Dissolved Oxygen	Comment
SILVICULTURAL PRACTICES									
Two Stage Shelterwood	25,000 Ac.Ft. 0.3% increase	site specific increase	site specific increase	20,000 lb 0.00000006% increase	slight increase	slight increase	slight increase	slight increase	Effects of removing trees independent of any soil disturbance
Clearcutting	6,000 Ac.Ft. 0.07% increase	site specific increase	site specific increase	2,000 lb 0.000000018% increase	slight increase	slight increase	slight increase	slight increase	
Commercial Thinning	2,350 Ac.Ft. 0.01% increase	site specific increase	site specific increase	slight increase	slight increase	slight increase	slight increase	slight increase	
TRANSPORTATION SYSTEM:									
500 Miles Permanent Road Constructed	8,680 Ac.Ft. increase	slight increase	slight increase	increase amount unknown	slight increase	increase 1,322,343 tons over 10 years	slight increase	slight increase	Impacts due to road construction would be long term, permanent
100 Miles Road Reconstruction	868 Ac.Ft. increase	slight increase	slight increase	slight increase	slight increase	increase 134,268 tons over 5 years	slight increase	slight increase	
50 Miles Road Surfaced	260 Ac.Ft. increase	no change	no change	slight increase	slight increase	decrease 61,030 tons over 10 years	slight increase	slight increase	
YARDING AND LOADING PRACTICES:									
Tractor Systems	6,723 Ac.Ft. increase	site specific increase	site specific increase	increase amount unknown	increase amount unknown	increase 445,847 tons over 5 years	site specific	site specific	Compaction & surface Disturbance initiate impacts to runoff water
Cable Systems	1,281 Ac.Ft. increase	site specific increase	site specific increase	increase amount unknown	increase amount unknown	111,600 tons over 5 years	site specific	site specific	

Table 3-14 continued

Management Treatment	Water Yield (compared to WY 1975) Annual Yield	Average Peak Flow	Large Peak Flow	Water Quality Total Nitrogen	Other Chemicals	Sediment Yield	Tempera-ture	Dissolved Oxygen	Comment
DEVELOPMENT PRACTICES:									
Slash Disposal	300 Ac.Ft. increase	site specific slight increase	site specific slight increase	slight increase	slight increase	increase 67,500 tons over 5 years	slight increase	site specific decrease	Slash disposal would occur after yarding and loading decrease of the timber
Mechanical Scarification	16 Ac.Ft. increase	site specific increase	site specific increase	slight increase	slight increase	750,000 tons increase	slight increase	slight increase	
Herbicide Site Preparation	increase amount unknown	increase amount unknown	increase amount unknown	increase amount unknown	slight increase	slight increase	slight increase	slight increase	Some slight hazard of water contamination by herbicide drift or residue would exist
Planting	78,125 Ac.Ft. decrease	decrease amount unknown	decrease amount unknown	slight decrease	slight decrease	slight decrease	slight decrease	slight decrease	
Precommercial Thinning	slight increase	unknown	unknown	unknown	unknown	unknown	unknown	unknown	
Fertilization	4,725 Ac.Ft. decrease	decrease amount unknown	decrease amount unknown	site specific increase	decrease amount unknown	slight decrease	no change	slight decrease	
TOTAL	-34,908 Ac.Ft. per year or 104,724 Ac.Ft. over 5 years	proportional increase as for annual yield	proportional increase as for annual yield	22,000 lb minimum increase over 10 years	propor-tional increase as for total nitrogen	3,499,856 tons due to the proposal over 10 years	propo-tional increase as for total nitrogen	propor-tional increase as for total nitrogen	
	Compared to annual yield of 4,880,000 Acre Feet per year average discharge for Rogue River at Agness, OR			0.0000016% of average concentra-tration of Rogue River at Agness, OR in WY 1975		2.4% increase over average sediment yield for entire JSYU over 10 years			
	This has slight significance to the water resources of SW Oregon.			This is not a significant increase.		This has localized significance in the areas affected by the proposal.			

Table 3-15

Impacts on Water Resource Projected from BLM-Administered Lands to all Forested Land in the Rogue River Basin

Practice and Agency	WATER YIELD (acre feet/ initial year)	TOTAL NITROGEN (pounds/ increase 5 years)	SEDIMENT YIELD (tons - 5 years)
Silvicultural Practices:			
BLM	33,350	22,000	
USFS	10,865	25,100	
State and Private	43,520	123,500	
County	0	0	
Total	87,735	170,600	slight increase
Transportation System:			
BLM	9,808		1,527,815
USFS	1,615		251,502
State and Private	302		47,010
County	30		4,701
Total	11,755	slight increase	1,831,028
Yarding and Loading:			
BLM	8,004		557,447
USFS	104,164		7,254,632
State and Private	66,216	increase, amount unknown	4,611,680
County	1,162		80,907
Total	179,546		12,504,666
Developmental Practices:			
BLM	-4,466		817,500
USFS	-1,883		257,812
State and Private	-636	slight increase	4,690,596
County	-139		540
Total	-7,124		5,765,962
TOTAL	271,912	70,600	20,101,676
(and BLM % of total)	(17%)	(13%)	(14%)

habitat. However, truncated succession due to forest development practices would abbreviate the time that early successional stage habitat is available to wildlife. Destruction of mature and old growth habitat would be permanent because second growth trees would be harvested before they attained the ages of their predecessors. Snag removal, accomplished during timber harvest for safety reasons, would eliminate critical habitat for a variety of animal species. The removal of dying trees for insect or disease control precludes the development of succeeding snags to replace those trees which eventually decay and fall.

An undetermined amount of TCDD (dioxin) bioaccumulation is possible in animals exposed to silvicultural applications of the herbicide silvex.

Fish and aquatic invertebrates would be adversely impacted by bottom sediment accumulation and suspended sediment levels fostered by vegetation removal and soil disturbance characteristic of logging operations. The construction of logging roads would also contribute substantially to increased sedimentation in streams. Silvicultural applications of fertilizer may increase nutrient enrichment of streams, leading to increased algal growth which increases biochemical oxygen demand and, in turn, may decrease the amount of dissolved oxygen available for the sustenance of fish. Silvicultural herbicide application would introduce undetermined levels of toxic chemicals in the aquatic environment. It is possible, although doubtful, that levels of toxic chemicals so introduced could exceed lethal levels for some aquatic organisms.

A tabular summary of major impacts is presented as Table 3-16. The quantification of impacts is based on a comparison of the current management plan with the proposed management plan (see Section 1.9).

3.2.1 Terrestrial Vegetation

Based on the relative proportions of commercial forest lands in the different vegetation zones, approximately 93 percent of all the land impacts of the proposed action would occur in the Conifer/Hardwoods and Mixed Conifer vegetation zones. Impacts are not quantified by vegetation zone due to the uncertainty of where specific management techniques would be applied. Impacts on terrestrial vegetation are discussed by operational systems.

3.2.1.1 Silvicultural Practices

For purposes of this analysis, the term "silvicultural practice" refers solely to a method of cutting timber and does not include the subsequent removal of logs or any other management practices.

Short-Term Impacts

Tree Mortality

The proposed action would result in the felling of approximately 160,000 commercial trees per year, based on a total annual harvest volume of 103 million board feet and an average net volume of 640 board feet per tree. In addition, an undetermined number of non-commercial species (equal to all the non-commercial specimens growing on areas to be harvested) would be cut.

Table 3-16

Summary of Major Impacts to Biological Environment

INDENTIFICATION OF MAJOR IMPACTS — TERRESTRIAL VEGETATION

Impacts	Unit of Measure	Current Mgmt (see Sec. 1.9) Short-Term	Current Mgmt Long Term	Proposed Mgmt Plan Short-Term	Proposed Mgmt Plan Long Term	(degree impacts would change) Short-Term	(degree impacts would change) Long-Term	Remarks
Death of commercial trees	no. trees/ decade	228,000	unknown	160,000	unknown	-30%	less	no. trees based on avg. volume/tree
Initiation of secondary succession	no. acres	65,600	unknown	55,000	unknown	-16%	-16%	
Elimination of mature communities	no. acres	0	41,000	6,800	37,200	+6,800 acres	-11%	new impact in Decade 1
Elimination of old growth communities	no. acres	44,000	126,640	27,000	111,423	-39%	-12%	
Alteration of community longevity	max. age attainable	80	80	80	80	none	none	assumes max. comm. age age = 80
Destruction of surface vegetation	no. acres	13,300	-	25,400	-	+91%	-	increase indicative of higher intensity management
Alteration of plant habitat	no. acres	65,600	334,500	55,000	222,058	-16%	-34%	
Complete elimination of plant habitat	no. acres	4,340	4,340	4,340	4,340	none	none	
Introduction of exotic species	no. species	unknown	unknown	unknown	unknown	unknown	unknown	
Change in community structure	no. acres	65,000	334,500*	55,000	222,058*	-16%	-34%	*acreages in respective CFL bases
Seral truncation	no. years	>1	>1	>1	>1	greater	greater	impact tied mainly to planting and development practices
Herbicide-induced reduction of non-conifer productivity	no. acres	0	0	47,700	unknown	+47,700	unknown	impact unique to proposal
Increased productivity for conifers	% increase	unknown	unknown	unknown	unknown	greater	greater	impact tied to proposed development practices and stand regulation

Table 3-16

Summary of Major Impacts to Biological Environment (Continued)

INDENTIFICATION OF MAJOR IMPACTS		TERRESTRIAL VEGETATION						
		Current Mgmt (see Sec. 1.9)		Proposed Mgmt Plan		(degree impacts would change)		
Impacts	Unit of Measure	Short-Term	Long Term	Short-Term	Long Term	Short-Term	Long-Term	Remarks
Destruction of endangered species	no. species	unknown	unknown	unknown	unknown	unknown	unknown	
Herbicide-induced mutagenesis	no species impacted	none	none	unknown	unknown	unknown	unknown	impact unique to proposal
			AQUATIC VEGETATION					
Plant habitat displacement from bridges and culverts	perennial	7.2	unknown	7.2	unknown	none	none	
	intermittent stream miles	10.7	unknown	10.7	unknown			
Other community changes	unknown		unknown	unknown	unknown	unknown	unknown	
			TERRESTRIAL ANIMALS					
Increase in early seral habitat	% increase*	+300	unknown	+275	unknown	-25	unknown	* of BLM, JSYU Total
Truncation of seral habitat	affect on animals	unknown	unknown	unknown	unknown	greater	greater	impact tied to planting and development practices
Decrease in mature-old growth habitat	% decrease*	-35	-100	-22	-95	-13	-5	* of BLM JSYU Total
Small mammals benefited by seral changes	% species in Table 2-11*	14	14	14	14	none	none	* Table 2-11 not inclusive of all species in JSYU
Small mammals unaffected by seral changes	"	65	65	65	65	none	none	
Small mammals adversely affected by seral changes	"	21	21	21	21	none	none	
Non-game birds benefited by seral changes	% species in Table 2-12*	24	24	24	24	none	none	* Table 2-12 not inclusive of all species in JSYU
Non-game birds unaffected by seral changes	"	48	48	48	48	none	none	

Table 3-16

Summary of Major Impacts to Biological Environment (Continued)

INDENTIFICATION OF MAJOR IMPACTS		TERRESTRIAL ANIMALS						
	Unit of	Current Mgmt (see Sec. 1.9)		Proposed Mgmt Plan		(degree impacts would change)		
Impacts	Measure	Short-Term	Long Term	Short-Term	Long Term	Short-Term	Long-Term	Remarks
Increase in deer carrying capacity*	% increase	+600	unknown	+600	unknown	none	none	on harvested buds only*
Increase in potential elk use	% increase	+400	unknown	+400	unknown	none	none	" "
Increase in blue grouse & mtn. quail habitat	% increase	+300	unknown	+275	unknown	none	none	" "
Changes in invertebrate diversity	% change	unknown	unknown	unknown	unknown	none	none	" "
Changes in spotted owl populations	% change	assumed negative	assumed negative	assumed negative	assumed negative	less negative	less negative	
Impacts to reptiles & amphibians	-	unknown	unknown	unknown	unknown	unknown	unknown	
Increases in animal stress	no. species susceptible	unknown	unknown	unknown	unknown	unknown	unknown	
Permanent displacement of habitat	no. acres	4,340	4,340	4,340	4,340	unknown	unknown	
Lethal exposure to herbicides	no. animals	0	0	unknown	unknown	unknown	unknown	impact unique to proposal
TCDD bioaccumulation	no. animals	0	0	unknown	unknown	unknown	unknown	impact unique to proposal
Herbicide carrier toxicity	no. animals affected	0	0	unknown	unknown	unknown	unknown	impact unique to proposal
			AQUATIC ANIMALS					
Physical habitat alterations	stream miles	unknown	unknown	unknown	unknown	unknown	unknown	
Biological habitat alterations	stream miles	unknown	unknown	unknown	unknown	unknown	unknown	
Mechanical displacement of physical habitat by structures	stream miles	7.2	7.2	7.2	7.2	none	none	
Toxic TCDD dosage	no. fishes affected	0	0	unknown	unknown	unknown	unknown	impact unique to proposal
TCDD bioaccumulation	no. species susceptible	unknown	unknown	unknown	unknown	unknown	unknown	impact unique to proposal
Fertilizer-induced eutrophication	stream miles affected	0	0	unknown	unknown	unknown	unknown	impact unique to proposal

Initiation of Secondary Succession

The removal of trees creates openings in the forest canopy, which allows more light to penetrate to lower forest strata. Timber harvesting, therefore, initiates secondary succession (Section 2.1.2.2, Succession) in the same way as other natural disturbances do. Different silvicultural systems open the forest canopy to different degrees, thereby influencing the plant composition and duration of the seral communities differently.

Clearcutting completely removes the forest canopy, thereby allowing the establishment of a well-developed grass/forb stage. Two-stage shelterwood cutting, by virtue of lessened canopy removal does not allow as much grass/forb development and probably produces an initial community more similar to a transitional grass/forb/shrub seedling community. Regardless of these potential differences, the short-term impact of the proposal would be the conversion of approximately 55,000 acres of commercial forest to early seral stage communities (including both grass/forb and shrub/seedling seral stages).

Because natural succession is largely a function of time, the seral stage communities of 1977 will undergo transition. Some of these communities will succeed out of the early stages and into later ones. The number of acres which will undergo this transition is impossible to estimate accurately without a full tabulation of existing (1977) seral communities by actual age of individual parcels. However, if it is arbitrarily assumed that 50 percent of the current (1976) early seral communities (roughly 24,500 acres) will naturally succeed into the pole/sapling stage within 10 years, it may be further speculated that approximately 67,250 acres of early seral communities would be in existence by the end of the first decade of the proposed management plan. In other words, the proposed action will contribute to an estimated 275 percent increase in early seral stage communities in the next decade.

Concomitant with the creation of 55,000 acres of early seral stages is the removal of approximately 7,000 acres of mature and 27,000 acres of old growth forest communities. These reductions, as offset by small acreage contributions due to the progression of time, represent an 18 percent reduction in existing mature forest and a 24 percent reduction in existing old growth forest. The pole/sapling and young second growth stages will not be impacted by timber harvest during the first decade of the proposed plan. Their acreages may be expected to increase by roughly 150 and 100 percent, respectively, however, because of successional recruitment from younger age classes.

Commercial thinning, proposed for application on 4,700 acres, also opens the forest canopy but to a lesser degree than clearcutting or shelterwood cutting. Although understory vegetative production may be somewhat stimulated, canopy opening is not sufficient to allow development of earlier seral stages. Commercial thinning promotes accelerated rates of wood production in uncut trees. Thus, commercial thinning may be viewed as accelerating natural succession. This impact would be generally negligible, however, because all merchantable timber would be harvested eventually.

Sanitation salvage logging, by the removal of individual trees, also stimulates growth in adjacent trees or shrubs. Therefore sanitation salvage logging impacts vegetation much the same as commercial thinning, only to a lesser extent.

Long-Term Impacts

Alteration of Community Longevity

Although forest trees are a renewable resource, mature (120-190 years) and old-growth (200+ years) forests are non-renewable on commercial forest lands proposed for high intensity methods of management in the JSYU. Although older trees harvested in conjunction with the proposed management plan would eventually be replaced by others of the same species, the replacements would not be allowed to attain the longevities of their predecessors.

It is estimated that 6,768 acres (18 percent) of the currently existing mature forest would be cut during the first decade of the timber management plan. If the proposed plan were implemented into perpetuity, ultimate elimination of these age classes from high intensity management lands would occur within 6 decades. Similarly, it is estimated that 26,617 acres (24 percent) of the existing old growth would be harvested during the first decade of the management plan. Ultimate elimination of old growth from high intensity management lands would occur by the end of the 5 decades if the management plan were to be implemented into perpetuity. Following the removal of mature and old growth forests, the probable maximum age that commercial trees would reach before harvest is 80 years.

3.2.1.2 Yarding and Loading

Yarding is the movement of felled timber to a landing from which the logs are loaded onto a truck. Yarding in the JSYU is by tractor or cable. Based on past timber sale contracts within the district, it is estimated that approximately 77 percent of the proposed harvest would be yarded by cable methods and 23 percent by tractor. All the impacts from yarding and loading are expected to be short term.

Direct Mortality or Injury to Plants

Both tractor and cable yarding entail dragging logs across the forest floor. Logs are constantly in contact with the soil in tractor yarding whereas with certain cable yarding methods the logs are suspended above the soil for most of the way to the landing. Tractor yarding, therefore, causes greater proportional mortality to forest floor vegetation than cable yarding does.

According to studies reported by the Environmental Protection Agency (U.S. EPA 1973), tractor yarding following clearcutting in western Washington resulted in baring 26.1 percent of the site to mineral soil. If this relationship is applicable to the JSYU, approximately 287 clearcut acres can be expected to be completely denuded of ground vegetation by the proposed action. U.S. EPA also reports that high lead cable yarding in conjunction with clearcutting bared 12.1 percent of the site to mineral soil (Ibid.). Application of this data to the JSYU indicates that approximately 466 acres would be made bare of ground vegetation by clearcutting followed by cable yarding.

By assuming that the regeneration cut of a shelterwood system (which removes about up to 60 percent of the forest canopy) results in only 60 percent of the soil surface impacts of a clearcut, it is estimated that regeneration cutting followed by tractor yarding would bare approximately 1,475 acres. It is further estimated that regeneration cutting followed by cable yarding would bare approximately 2,950 acres.

The shelterwood final harvest cut (which removes the remainder of the canopy) in conjunction with tractor yarding is estimated to remove all the ground vegetation on approximately 216 acres. Shelterwood removal in conjunction with cable yarding is expected to bare the soil on approximately 430 acres.

In total, both yarding systems are expected to contribute to the total removal of approximately 5,100 acres of surface vegetation in the JSYU over the 10 year life of the proposed action. Depending on the severity of subsequent erosion, the majority of the denuded areas can be expected to naturally revegetate within 1 or 2 years.

Both yarding methods may injure standing trees, exposing them to insect or fungus infestation which may eventually result in death. Tractors, or the logs being dragged by them, may collide with trees, bruising or slashing them. Logs suspended from cables may slip or swing into standing trees causing upper stem or crown injuries. The extent of mortality or injury to trees is impossible to estimate but is expected to be minor.

Alteration of Plant Habitat

Alteration of plant habitat is a function of soil disturbance and the destruction of vegetation which previously grew on the disturbed site. Skid trails and vehicle tracks, in addition to destroying vegetation, compact the soil, reducing its suitability for certain species of plants and favoring the invasion of species tolerant of compaction.

Yarding activities, especially tractor yarding, disturb forest litter and expose bare mineral soil, creating a better seed bed for many species (including Douglas-fir and most other conifers). Conifer reproduction, therefore, is enhanced by yarding activity, especially if associated soil compaction is not too great.

Skid trails often serve as channels for overland runoff and may reduce moisture infiltration on slopes. Therefore less moisture is available for plants near the upper ends of these trails, whereas plants at the lower ends of the trails may receive a disproportionate share. Depending upon topography, overland flow may impound at the lower ends of skid trails, creating temporary pools, or it may flow unimpeded into streams. In the former situation some vegetation (especially herbs) may be lost because of inundation while water-loving ephemerals may become established in the temporary pools. In the latter situation moisture stress may develop in the upper drainages, and gullies fostered by runoff may cut to bedrock and remain unvegetated.

3.2.1.3 Road Construction, Renovation and Maintenance

Road construction or renovation of existing roads is anticipated to add approximately 500 miles of road to the current network in JSYU. This construction would amount to approximately 4,340 acres. Many discrete impacting operations are associated with road construction and renovation. They include operation of tracked and wheeled vehicles, blasting, excavating, deposition of overburden and water application. All of the impacts are long term and are expected to persist until roads are abandoned and rehabilitated.

Complete Elimination of Vegetation

Most of the roads to be constructed within JSYU would be permanent, with all-weather surfacing. This type of road requires construction techniques which completely eliminate vegetation from the roadway and shoulder. Subsequent maintenance activities prevent natural succession. Therefore, initial construction eliminates the existing vegetation while traffic and regular maintenance perpetuate the impacts of construction. The ultimate impact of road construction and maintenance would be complete elimination of biological productivity (including timber production) on the entire 4,340 acres devoted to new road construction in the JSYU and perpetuation of this impact for the time that these roads remain under maintenance. The construction of these proposed roads would increase the total amount of acreage devoted to roads from the present 13,000 acres to 17,000 acres.

In addition to elimination of roadway vegetation, construction and maintenance may injure or kill adjacent vegetation. This effect could occur from bruises due to machine operation or from herbicide overspray along road shoulders.

Alteration of Plant Habitat

Road construction severely alters plant habitat both on-site and off-site. Soil compaction within the roadway is usually so great that many years would be required for plants to re-colonize, even if there were no traffic or maintenance.

Road surfaces are pitched to allow drainage. As water drains from the roadway and off the shoulders it creates moister soil conditions and provides habitat for plant species tolerant of disturbed soil and periodic excesses of water. Removal of vegetation from the roadway provides increased sunlight for roadside plants, which generally accelerate their growth in response. These factors (increased moisture, soil disturbance and increased sunlight) are often responsible for the rank growth of roadside "invader species" which are periodically removed by herbicide treatment or other maintenance.

Blasting and excavation for roadways often generates soil materials which are unsuitable for construction use or are in excess of needs. These materials are often deposited in areas away from the site. This practice creates a potential adverse impact to offsite vegetation which may be injured or completely covered by the deposition of overburden.

Introduction of Exotic Plant Species

Road-building equipment may inadvertently transport seed or

viable rootstocks from one locality to another. In some cases bulldozers, road graders or trucks may introduce the seeds of problem species, such as tansy ragwort, into new localities of the forest. As these plants become established they may out-compete native species at the site, establish reproducing populations and spread throughout the adjacent area.

3.2.1.4 Development and Protection Practices

Almost all development and protection practices require human activity for short periods, the effects of which are short-lived impacts that cease when the activity stops or moves on. Examples of these effects are noise and air pollution from operating machinery. Animals may be disturbed by sound or smell, and the visual aspect of the forest is changed. The effects of the practices themselves, however, are longer lived.

Development practices reestablish trees on forest land following harvest or natural catastrophes and ensure satisfactory or optimum growth. Individual practices are not necessarily used simultaneously, neither are they usually all applied to a single area. Many of the practices are alternative methods, the choice of which is dependent upon the conditions of the area.

<u>Scarification</u>

Scarification completely removes woody shrubs and removes or injures many plants in the herbaceous layer. All the impacts resulting from scarification are expected to be short term. Threatened or endangered species could be killed or damaged. Soil moisture relationships would be affected by the break-up of the soil surface and the intermingled surface organic matter.

The disturbance of the soil would affect the availability of nutrients to the detriment of some species and the favor of others, due both to the physical mixing and to the changes in soil moisture relationships. Removal of vegetative material, which through a death and decay process ultimately would have become recycled nutrients for new plant growth, would be a loss of nutrients.

Sudden removal of the lower canopy and shrub canopy would allow more light to reach the herbaceous layer, releasing those species to achieve their full photosynthetic growth potential. Increased exposure to sunlight would also affect soil temperature, which in turn affects soil moisture relationships and a large range of biochemical reactions. Soil temperature increase would generally favor increased soil microbial activity and increased plant growth up to a point, beyond which any temperature increase would severely limit plant growth, especially by newly germinated plants or planted seedlings.

The primary impact of scarification upon forest vegetation would be a change in the structure of the pre-existing community. This change could mean total loss or reduction in quality of habitat on the site for affected species, including any threatened or endangered species present. Under the proposed timber management plan, approximately 160 acres would be mechanically scarified before replanting.

Slash Disposal

Burning

Slash disposal by burning would be practiced on about 10,100 acres. The effects of burning would be short-term and limited to small areas. While the chance of wildfire would be present, State and BLM safety measures would reduce the hazard.

Burning usually eliminates most above-ground plant tissue, dead and alive, effectively returning all the nutrient elements tied up in the plant tissue to the soil as ash deposit, except for the portions lost to the atmosphere as smoke. The blackened ground would increase insolation, raising the soil temperature. Some of the nutrients in the ash could be lost to wind or water erosion before they became incorporated into the topsoil, but, generally, nutrient availability would be increased in the burned areas (West 1968).

Conifer and other plant seed could be destroyed or made sterile by the heat from the burning. Some plants, such as most grasses, have growing points that are close to or below the ground surface and can survive all but the hottest fire. Many shrubs have the ability to resprout from surviving stumps and roots and are stimulated by fire. So, while the immediate impact of burning would be bare black ground, secondary succession (accelerated by the crown canopy removal) would produce a more vigorous vegetative cover than existed before the area was burned.

The burning and deposition of ash and the resultant changes in soil moisture relationships, nutrient availability and soil temperatures would alter the structure of the original understory plant community. Scheduled replanting of Douglas-fir seedlings in the area would contribute to the alteration as a fire-induced seral stage became established. Threatened or endangered species could be lost to the community.

Gross Yarding

Gross yarding is an intensification of a conventional yarding method. As such, the effects of the vegetation and resulting impacts on the forest environment would be an extension of those analyzed under Yarding and Loading Practices above. Approximately 33,500 acres of logged sites would undergo slash removal by gross yarding if the proposed timber management plan is implemented. Arbitrarily assuming that gross yarding would bare about 15 percent of the treated acreage, it can be speculated that approximately 4,340 acres would be bared by gross yarding.

Planting

Short-Term Impacts

Under the proposed timber management plan, Douglas-fir seedlings raised in nurseries would be planted on 50,200 acres. Approximately 41,000 acres of this total would be on clearcut tracts or on tracts subjected to first-stage (regeneration) cut under a two-stage shelterwood harvest system. The remainder would involve replanting or interplanting of previously clearcut sites that are presently either not stocked or understocked. An aggregate of 12,300 of the total 50,200 acres would be programmed for possible

replanting and interplanting on sites where the initial treatment failed to accomplish adequate stocking levels.

Planting practices are designed to shorten the time commercial conifer species otherwise need to become reestablished after logging. Planting greatly increases the competitive advantage of the conifer seedlings over the vigorous released growth of the plant communities present on a logged area. Under the best possible site conditions, natural regeneration could occur in as rapid a span as 1 year. Under artificial regeneration, seedlings are generally planted the first year following harvest. Because the planting stock is generally already about 2 years old, it has, as artificially planted trees, at least a 1-year competitive advantage on good sites. This competitive advantage is greater on poorer sites. Therefore, planting shortens the amount of time required for natural succession to progress beyond the grass/forb and shrub/seedling stages.

Long-Term Impacts

The major long-term impact associated with planting is that, by increasing the competitive advantage of Douglas-fir, it truncates natural succession. In other words, early successional stages are more quickly passed through and Douglas-fir attains quicker site dominance. This acceleration not only reduces the residence time of early seral stages but also precludes the development of maximum plant diversity.

Chemical Weed Control (Herbicides)

Short-Term Impacts

Alteration of Natural Productivity. Herbicides are used to manipulate the species composition, size, density, vigor and presence of vegetation. In forestry applications, the desired impacts are to accelerate plant succession from early seral stages to later stages dominated by conifers. This seral acceleration occurs by selective limitation of competition from plants characteristic of early seral stages in favor of rapid Douglas-fir establishment and growth.

Herbicides would be used in the JSYU both for site preparation (on 34,500 acres) and conifer release (13,200 acres). Both applications are targeted at the control of nonconiferous species to provide a competitive advantage for conifers. Different herbicides work best for different target species (as explained in Section 1.6.4.1). Therefore herbicides are often used in combination.

The direct vegetational impacts of silvicultural herbicide treatments are short-term. Grass may be controlled for only 1 to 3 years with atrazine and dalapon while conifer seedlings become established. Grass may then partially reoccupy the site until Douglas-fir crown closure shades it out. Similarly, most species of shrubs will resprout after treatment. Brush may resume dominance after site preparation spraying. However, it will generally not resume dominance after stand release spraying.

Therefore, the net short-term impacts of successful site preparation spraying in the JSYU would be a temporary reduction (of unquantifiable magnitude) of the natural productivity of grasses on approximately 2,000 acres proposed for stand release treatments with atrazine and/or

dalapon. In addition, natural production of forbs and shrubs would be reduced on approximately 11,000 acres to be treated for stand release.

A temporary reduction in the natural productivity of grasses, shrubs, and herbaceous species would be expected on approximately 20,000 acres proposed for site preparation spraying with dalapon and atrazine. Temporary productivity reductions for herbs and shrubs would be anticipated for all 34,500 acres proposed for site preparation treatments with 2,4-D; silvex, Roundup and Krenite. These losses in herbaceous and shrubby vegetation production would be offset by increased production of coniferous species. Gratkowski (1967) reported that height growth of released trees was 29 to 86 percent greater than was height growth of trees growing under live ceanothus.

Impacts to Non-Target Vegetation. Non-target vegetation, such as agricultural crops, stream buffers and rare or endangered species may be affected by the movement of herbicides through the air, water or soil. Herbicide application may result in short-term damage (or even destruction) of conifer stands. Minor burning of conifer needles is a common impact when silvex and/or 2,4-D is used. These types of impacts defy accurate prediction and, therefore, cannot be quantified.

Long-Term Impacts

Plant Community Alterations. Brush control activities may result in the removal of major hardwood components in unmanaged forests. Therefore, herbicide application (in conjunction with other development practices) may result in the eventual removal of co-dominant species of hardwoods in the Douglas-fir/Hardwoods Zone. Through the use of herbicides in an even-aged management scheme, forests are produced with relatively even-aged stands. Assuming that 35 percent of the timber harvest would occur in the Douglas-fir/Hardwood Zone and that a proportional amount of herbicide spraying would occur there, approximately 12,100 acres could be changed to even-age, Douglas-fir dominant stands.

As previously mentioned the direct vegetational impacts of herbicide application are short term. The effects of accelerating the establishment of conifer stands, however, are long term. Once the coniferous stands become dominant they will persist until the trees are harvested or until insects, disease or natural disasters remove them. Under fully managed conditions, the maximum amount of time the conifers can be expected to remain until logging is 80 years.

Mutations. 2,4-D has been shown to mutate certain agricultural plants. No specific effects are known for silvex (Mrak 1969), however. Atrazine was shown to have a slight effect on meiosis when applied to the anthers of barley. No conclusive evidence of plant mutations was found for either dicamba or dalapon. The occurrence or significance of mutations arising in nature from the use of these compounds is unknown.

Fertilization

Approximately 22,300 acres of timber stands would be fertilized after proposed precommercial and commercial thinning operations. The impacts associated with fertilization would be short term. This practice would mean a faster growth for

commercial conifer species and changes in soil moisture relationships and nutrient availability that could favor the establishment of new species while decreasing the vigor of, or eliminating, existing species. The physiology of threatened or endangered species and/or their competitive status in the community could be negatively impacted.

Precommercial Thinning

Precommercial thinning of some 14,200 acres would take place in the next decade under the proposed action. Removal of selected trees from the general level of the stand canopy would release the remaining trees from competition for light, moisture, and nutrients and thereby allow them a more optimum growth rate. Understory plants could be damaged during the thinning operation, including any threatened or endangered species present.

The stands treated could be so thick that most of the cut trees would remain in place, supported by living trees. Therefore, the resulting impacts to the understory vegetation would be gradual, as the dead trees fell and decayed with the passage of time and growth of the remaining stand. However gradual, the change in available light, soil moisture relationships, and nutrient availability could change the structure of the original understory community.

Fire Control

Fire suppression as a practice occurs on an emergency basis. Standard operations would be performed as suppression measures, but the extent and intensity of their application would be determined entirely by unscheduled events of unpredictable magnitude, i.e., wildfires.

In general it can be assumed that any damage sustained by vegetation due to fire suppression activities would be less than that caused by unsuppressed wildfire. However, suppression activities would cause site-specific damage to surface soils or root systems that would have longer-lasting effects on vegetation than would burning but would affect relatively small areas. Examples are fire breaks, clearings for helicopter landing sites, and soil compaction due to wheeled or tracked off-road vehicles. This type of physical disturbance would kill and/or injure plants and could cause changes in the community structure. Threatened or endangered species may be impacted directly or indirectly.

More subtle impacts would be those perpetuated by continued fire suppression, in the form of changes in successional patterns that result from elimination of the natural influence of fire. For instance, in the Douglas-fir/Hardwoods Zone, some of the brushfield communities are fire induced and maintained, so that, with elimination of periodic wildfire, conifers could become established and eventually dominate the site (Franklin and Dyrness 1973). On some sites in the Mixed Conifers Zone, fire-induced shrubs such as Ceanothus velutinus, by fixing nitrogen and shading, could provide a favorable environment for establishment of conifer seedlings; conversely, on other sites, the same shrub may become dominant and seriously hinder conifer establishment. Accumulation of understory vegetation due to fire suppression could provide a heavier and more continuous fuel situation that would allow inadvertent

wildfire to burn more intensely, destroying the upper canopy and timber species that would receive minimal damage under lighter fuel conditions (Arno 1976; Heinselman 1971).

Silvicultural Control of Insects and Disease

Forest insect control by silvicultural methods would be a matter of discriminating for insect control in scheduled silvicultural practices and applying the same practices to specific problem sites. Impacts to the forest vegetation would be of the same type analyzed under silvicultural practices in this section. Forest disease control by silvicultural practices would be a matter of discriminating for disease vectors in scheduled silvicultural practices, and when necessary applying these practices to specific problem sites. Impacts to the forest vegetation would be the same type analyzed under silvicultural practices.

Direct physical control of dwarf mistletoe, being essentially discrimination in normal silvicultural practices, should not cause any impacts not previously analyzed.

Conclusions

Alterations to community structure and community longevity would be the most significant impacts to terrestrial vegetation. Compared with the existing timber management plan, the proposed action would represent a short-term increase in the rate of mature community elimination but fewer acres would be eliminated in the long term. These impacts are significant because they represent the long-term elimination of the majority of old growth and mature forest communities from commercial forest lands in the JSYU. Continued forest management would not allow natural succession to replace these communities with the passage of time because future forests would be harvested before they reached the 80-year age class.

Other impacts to terrestrial vegetation are less significant because vegetation which is disturbed or destroyed by timber management would eventually be replaced by other plants of the same species and natural succession would be given time to restore community structure.

3.2.2 Aquatic Vegetation

Most potential adverse impacts to aquatic vegetation in the Josephine SYU have been effectively mitigated in the proposed timber management plan.

Loss of a small amount of aquatic habitat would result from stream crossings of newly constructed roads. It is estimated that one perennial stream (less than 5 cfs discharge) and four intermittent streams, on the average, must be crossed for each mile of new road construction. This means that 500 perennial stream crossings and 2,000 intermittent stream crossings could be expected with the proposed construction of 500 miles of new roads. Assuming that 90 percent of all proposed stream crossings would be by culverts and further assuming that the average culvert length is 40 feet for perennial streams and 30 feet for intermittent streams, it may be further speculated that approximately 7 miles of perennial and 10 miles of intermittent stream and riparian vegetation would be eliminated over the 10-year life of the proposed action.

Bridge crossings do not replace stream beds as culverts do. However, due to the constant dense shade under bridges, they may alter the natural vegetative production in streams. Assuming that the average bridge is 18 feet wide, perennial stream productivity may be altered in approximately .2 stream miles. Productivity would similarly be altered on approximately .7 miles of intermittent streams.

Aquatic vegetation also occurs in seeps and springs which are widespread and varied in size and flow rates. Timber management practices could severely affect these relatively small ecosystems, to the point of complete elimination of the spring or seep area, by drying up the water source. Any degree of chemical or sediment pollution could occur to the water flow. Any degree of killing or damaging injury could occur to the plant species present. Even slight modification would cause a change in species composition, i.e., relative numbers of each species in the community.

Fertilization of precommercially and commercially thinned timber stands and herbicide spraying, for site planting preparation and competition release, are not expected to significantly impact aquatic vegetation because of the no fertilization-no spray buffers along perennial streams. But fertilization necessary to revegetate roadsides could, through drainage and leaching, contaminate waters and thereby affect aquatic vegetation. Impacts would materialize as changes in both structure and composition of these plant communities. In the case of fertilizer pollution, increased nutrient levels in the water would favor an increase in algae and shade tolerant plants.

All impacts to aquatic and riparian vegetation are expected to be insignificant.

3.2.3 Threatened or Endangered Vegetation

In the absence of a detailed inventory of the vegetation on acreage identified as commercial timber base, it must be assumed that any of the species listed in Table 2-10, with locations confirmed or unconfirmed, could occur on any site that would be affected by the proposed timber management plan. However, in accordance with BLM policy (Section 1.6) no action would be taken that would jeopardize the existence of Federally listed plant species.

If any species of vascular plant is determined to be threatened or endangered by the finalized listing (to be published by the U.S. Fish and Wildlife Service), any action that contributes to its extinction or to its threatened or endangered status would be in violation of the Endangered Species Act of 1973. Therefore the Environmental Assessment Record (EAR), that would be prepared prior to any site specific action, would identify any threatened or endangered plant species known to be present on the site.

In a worst case situation, the required plant survey could miss some plant species. Seeds may not have germinated or flowers and fruits, frequently important in determining species, may not be present because of abnormal weather or time of survey. Species not on the Federal list or missed in surveys could be susceptible to any of the impacts described under terrestrial vegetation or aquatic vegetation. Under worst case conditions, the direct effects

of injury or death to the plants could cause the immediate extinction of a species in all or a significant portion of its range. The more subtle effects of vegetative community changes could cause the imminent extinction of a species through loss of competitive ability relative to other vegetation on the site.

3.2.4 Animals

The following analysis assumes that animal populations now in the JSYU are in equilibrium with the carrying capacity of their various habitats and that suitable habitat is randomly dispersed throughout the unit within the confines of the vegetation zones and seral habitats identified in Section 2.1.2.2. These assumptions are necessary for a qualitative evaluation of the impacts of a proposed action, which is not site-specific, on populations of unknown sizes and distributions. Each operational system is evaluated for its effects on animal populations exclusive of other management practices. Table 3-16 presents a cumulative summary of major impacts.

3.2.4.1 Silvicultural Practices

Silvicultural practices affect wild animal populations by altering habitat conditions and applying stress in the form of noise and activity associated with the cutting of trees.

Short-Term Impacts

Alteration of Habitat Conditions

As the vegetative community changes with timber harvest, associated changes occur in the conditions and types of food and shelter available. A definite, corresponding variation in faunal composition can be expected.

Community stratification and plant species composition differ with seral stage. As discussed in Section 2.1.2.2, plant community stratification and species composition are primary determinants of animal habitat. Therefore different seral stages generally are represented by different fauna. The seral stages, as earlier explained, are transitory, with early stages much shorter than later ones. As previously mentioned (Section 3.2.1.1) the proposed action would contribute to substantial changes in the amounts of seral communities.

Impacts to Game Animals. Black-tailed deer and elk are largely dependent for food on the early seral stages which result from logging operations. Deer are primarily browsing animals, consuming the leaves and twigs of shrubby vegetation, although they will also eat some grass and herbs. Roosevelt elk are primarily grazing animals, consuming grass and forbs, although they will also eat some browse. Both grass and browse are more available in the cutover forest than they are in closed canopy stands. Therefore the carrying capacity of the land for deer and elk is increased by logging as long as the resulting vegetative community is composed largely of grass, shrubs and forbs and sufficient escape and thermal cover is maintained nearby. As previously discussed, grass, shrubs and forbs are probably most abundant for 1 to 15 years following clearcuts west of the Oregon Cascades. Although no data are available, the same vegetative components are probably less abundant, and for fewer years, following shelterwood cuts.

The anticipated 275 percent increase in early seral stage habitat should be beneficial for deer and elk carrying capacity. Assuming that the pre-harvest carrying capacity of the 55,000 acres to be harvested was approximately 10 deer per square mile (860 deer) and that the relationship shown in Figure 3-4 is valid for the JSYU, the carrying capacity of the additional early seral stage habitat could increase by 600 percent to 60 deer per square mile (5160 deer). Although herbicides undoubtedly alter the production of deer and elk forage, the effects are not expected to be significant (Section 3.2.3.4, Herbicide Treatment). In actuality, deer population would probably not increase because deer density in the JSYU is more regulated by the carrying capacity of winter and year-long ranges than by forage abundance on the summer ranges, where most of the timber harvest would occur. Also, the reproductive potential of most deer populations is not great enough to allow such dramatic increases in such a short time. The most probable effect is that deer populations in the JSYU would either increase very slightly or not all. However, the removal of thermal cover from crucial winter range could cause a population decline particularly during a severe winter.

The same basic impact would be expected for Roosevelt elk populations. As shown in Figure 3-5, elk use is highest approximately 7 years following timber harvest (14 percent as opposed to 3 percent use 1 year after harvest). Therefore elk use could be expected to rise by over 400 percent on the 55,000 acres to be subjected to timber harvest over the life of the proposed action. Actually this would not occur because elk density in the JSYU is not sufficient to allow significant short-term response to widely dispersed, local forage increases. Most probably, elk populations would remain at low levels in spite of increased short-term forage supplies created by the proposed action.

Black bears have habitat requirements similar to those of deer and elk. For cover, they prefer brushfields interspersed within undisturbed coniferous forests. As with deer and elk, forest harvest increases the forage available for bears but may also reduce the amount of coniferous cover to the point where they may not go after the increased forage. Clearcuts provide more forage but partial cuts provide better cover. The proposed action, by virtue of its effect on early seral habitat, should increase bear carrying capacity. In view of recently observed population increases, bear density can be expected to increase in the JSYU.

Cougars generally base their territories in remote locations in mature forest communities in the JSYU. The animals have wide hunting ranges, however, which take them from the mature forest into habitats utilized by prey species. Black-tailed deer are probably the major prey. Therefore, timber harvest may reduce the suitability of cougar denning habitat while it improves the availability of prey. The disappearance of approximately 24 percent of the existing old growth habitat should have a negative impact on the cougar population in the JSYU.

Mountain quail prefer brushy openings in forested mountains where they feed on seeds and berries. Timber harvest should increase the amount of mountain quail habitat by

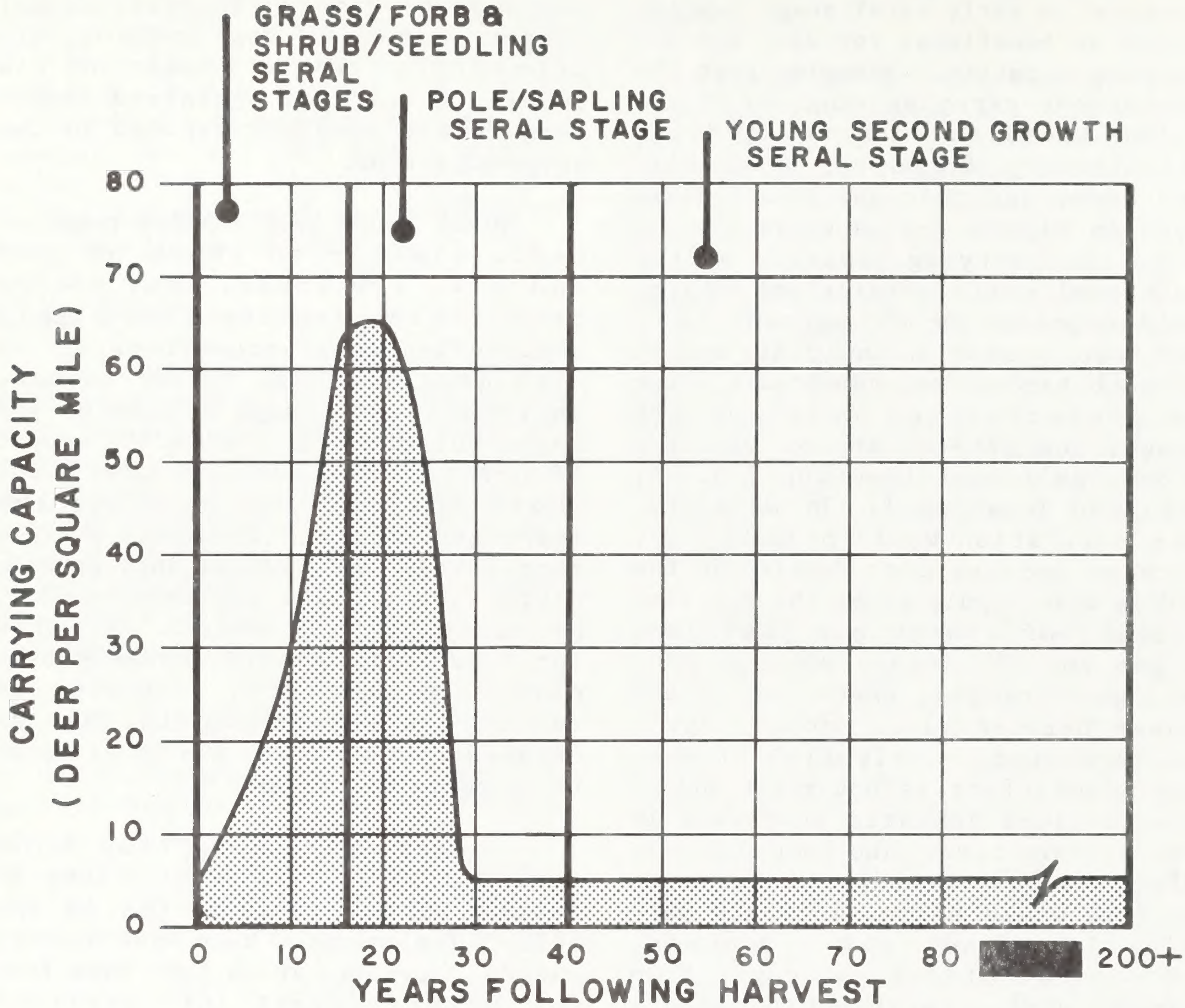


Figure 3-4 RELATIONSHIP BETWEEN TIME AFTER TIMBER HARVEST, VEGETATIVE SUCCESSION, AND DEER CARRYING CAPACITY*

SOURCE: Lawrence 1969 & Meslow & Wright 1975

*Values hypothetical for JSYU

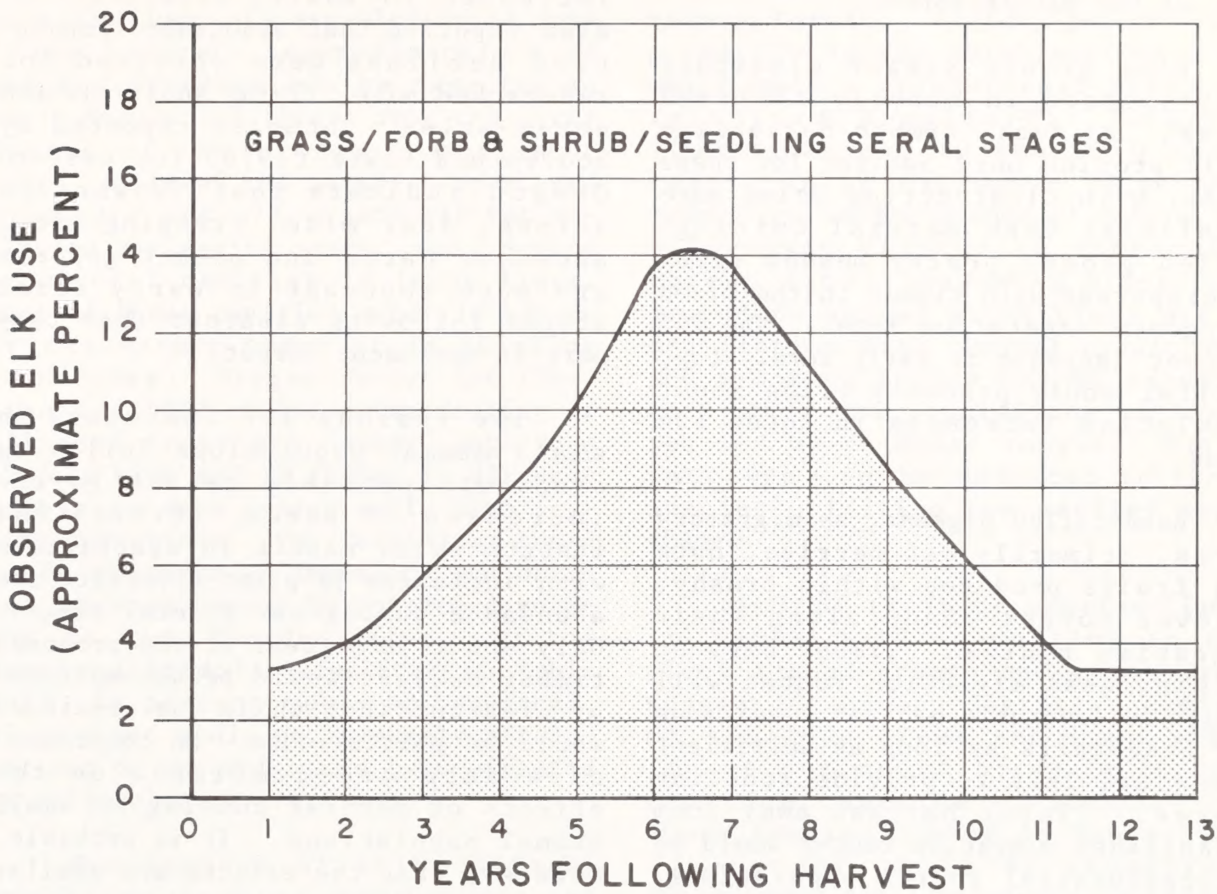


Figure 3-5 RELATIONSHIP BETWEEN TIME AFTER TIMBER HARVEST, VEGETATIVE SUCCESSION, AND PERCENTAGE OF ELK USE*

SOURCE: Harper 1969 & Meslow & Wright 1975

*Values hypothetical for JSYU

approximately 275 percent. Clearcutting would provide the best habitat, although partial cutting would improve mountain quail habitat over that of the mature forest.

Blue grouse prefer clearcuts interspersed in heavily timbered areas. As such, timber harvesting would provide more habitat for these birds, with clearcutting being more beneficial than partial cutting. Ruffed grouse prefer meadow areas interspersed with timber in the mixed evergreen vegetation zones. The 275 percent increase in early seral stage habitat would probably bring about population increases in these two birds.

Band-tailed pigeons, as migratory birds, primarily eat berries, nuts and fruits produced within brushy, cutover forest lands along their migration routes. Timber harvest within these migration routes will result in favorable habitat conditions for band-tails as long as sufficient trees are left to provide roosting places. Timber harvest away from established migration routes would be inconsequential to the populations.

Non-Game Animals. Alteration of habitat due to canopy opening has a profound effect on small mammal populations. For the first several months following clearcutting, while vegetation remains sparse, a drastic reduction in species and numbers of small mammals is apparent (Hooven 1969). As succession progresses to the grass/shrub and shrub/ sapling stages, however, small mammals increase in abundance and diversity in response to increased abundance and diversity of food. Tevis (1956), reporting on a study in the Douglas-fir region of northern California, observed that the populations of white-footed and big-eared mice, Townsend chipmunks, dusky-footed wood rats, digger squirrels, chickarees, gray squirrels and brush rabbits increased following clearcut. He also reported that associated population declines were observed for red-backed mice, flying squirrels and shrew-moles. Studies reported by Hooven and Black (1976) for western Oregon indicate that Trowbridge shrews, deer mice, creeping mice, snowshoe hares and pocket gophers are more abundant in early seral stages following clearcut than they were in the uncut forest.

The reasons for increases in small mammal populations following clearcuts probably relate to the increases of seeds, berries and insects which result in association with increases in plant diversity and abundance during early seral stages. Only about 10 percent of the proposed timber harvest would be accomplished by clearcutting, while the remainder would be partial cuts. No comprehensive data are available on the effects of partial cutting on small mammal populations. It is probable, however, that the effects are similar to those of clearcuts but do not produce changes that are equally dramatic. Population fluctuations would be moderated because some canopy remains after regeneration cutting, and the canopy is not completely removed until saplings of commercial tree species have begun to dominate the successional community.

The anticipated 24 percent reduction in old growth and 18 percent reduction in mature forest habitat would adversely affect species of mammals within the JSYU which preferentially utilize those habitats for feeding or reproduction. Among those species listed in Table

2-13 which would be adversely impacted by the proposed action are the long-eared myotis, big brown bat, raccoon, and marten. Assuming that currently existing habitats are already at carrying capacity, approximately a 22 percent decrease can be expected in their population levels over the first decade of the proposed management plan. Most of the mammals threatened by mature and old growth habitat depletion are cavity users. They depend on natural cavities in large trees. Most of these cavities occur in mature or overmature trees or in standing dead trees. Oregon Forest Law (Section 477.565) requires the felling of all dead trees and "snags" more than 15 feet high and 12 inches in diameter within an area concurrently with logging operations. The felling of these trees presents an immediate and obvious adverse impact to species dependent on them for den sites. Of the non-game animals tabulated in Table 2-13, 14 percent would be benefited, 21 percent would be adversely affected, and 65 percent would be unaffected by silvicultural practices.

The impacts of silvicultural practices on bird populations are generally more obvious than they are on other animal groups. Birds are the most diverse group of vertebrates in the JSYU. Many species are highly specialized in feeding or nesting habitat and are therefore dependent on the stratification and species composition of certain plant communities represented by the seral stages which follow timber harvest. Changes in plant community stratification or species composition have direct and profound effects on the bird population which occupied any site before logging disturbance.

Of 84 species of non-game birds which breed in the Douglas-fir region in western Oregon, 86 percent occupy the shrub/seedling seral stage (Meslow and Wight 1975). As a comparison, 69 percent occur in the mature forest. Fifteen percent nest primarily in the shrub/sapling stage while only 4 percent nest primarily in mature Douglas-fir forests. Timber harvest in the JSYU would result in an estimated 22 percent reduction in the amount of mature and old-growth habitat on commercial forest land. Assuming old-growth dependent animal populations are in equilibrium with current conditions, the proposed action can be expected to reduce the populations of these species by an equal amount. But an increase can be expected in those species utilizing the eariler seral stages.

Many of the bird species listed in Table 2-12 as nesting in the older second-growth and mature seral stages are cavity nesters. Removal of all dead trees and snags would impact dependent birds as it does dependent species of mammals. Of those species listed in Table 2-12, 24 percent would be benefited, 28 percent would be adversely affected, and 48 percent would be unaffected by silvicultural practices.

Furbearers. Two species of furbearers, the fisher and the marten, are dependent on mature and old growth habitats in the mixed conifer and Douglas-fir/Hardwoods Vegetation Zones for reproduction. The 22 percent decline in mature and old-growth habitat would adversely impact their population levels. They can be expected to decline in direct proportion to declines in their habitat. Beaver, mink, river otter, raccoon and bobcat populations are expected to be unaffected by silvicultural practices.

Endangered and Threatened Species. Habitat alterations caused by silvicultural systems and associated cutting practices would have the same types of impacts on threatened and endangered species that they would on other wildlife. Some endangered species may be unaffected, while others may be adversely affected.

The peregrine falcon (endangered status) would probably be unaffected by timber harvest. The species is not a forest dweller, foraging in open spaces and preferentially nesting in rocky outcrops near water. Most suitable habitat for the peregrine is confined to the Rogue River Corridor, for which no programmed timber harvest is scheduled. No peregrine falcons are known to occur in the JSYU, but they are expected occasionally along the Rogue River.

Bald eagles (threatened status) are present, although rare, within JSYU. The "wild" section of the Rogue River Canyon is the best foraging habitat for this species, and the mature forests in remote sections of the canyon provide excellent nesting and roosting habitat. Because the location of possible habitat areas are not presently known, in accordance with the project stipulation stated in Section 1.6, areas would be surveyed for bald eagle habitat in conjunction with site specific action planning. If it is determined from this survey that the proposed action would jeopardize this habitat, consultation with the U.S. Fish and Wildlife Service would be initiated. The action would be altered or abandoned as necessary. Impacts are therefore expected to be negligible.

The northern spotted owl (threatened, Oregon State list) is dependent on old growth, closed canopy forests. Pursuant to the Oregon Endangered Species Task Force recommendations, a joint agreement with the State of Oregon, U. S. Forest Service, and the U. S. Fish and Wildlife Service was signed, and BLM has agreed to protect 14 pairs of owls in the Medford District. Six of these have been assigned to the JSYU. The management plan agreed to by the cooperating agencies includes total protection of 300 acres of old growth core area (if available) and an additional 900 acres to be managed to provide at least 50 percent of the acreage on stands of 30+ year old forests.

Additional northern spotted owls in excess of the six pair may have their habitat reduced or eliminated if it is in a sale area. The results of this action are unknown. However, if it is assumed that all lands are at carrying capacity, then it is likely they would be eliminated.

Since the peregrine falcon and the bald eagle would probably not be impacted, formal consultation with the U. S. Fish and Wildlife Service (as directed in the Endangered Species Act Section 7 Regulations) is not required. However, the Fish and Wildlife Service was consulted informally during the preparation of the draft environmental statement. The agency concurred with BLM that it is improbable that timber management as proposed in JSYU would impact the peregrine falcon or the bald eagle. In conformance with BLM policy (Manual Section 6840), consultation and coordination with the Oregon Department of Fish and Wildlife is almost continuous with regard to these species.

Aquatic. The impacts of silvicultural practices on fish habitats

would be largely a function of the removal of vegetation. The impacts fall under the broad categories of increased accumulation of bottom sediments, increased turbidity, altered streamflow regimes, and introduction of logging debris.

The severity of these impacts is governed by the type of silvicultural system applied, the physical characteristics of the harvested site and the stream and the susceptibility of the fish population. Most of the impacts in water quality are short-termed, depending on the length of time it takes for natural succession to adequately revegetate the watershed. Headwaters fish populations, however, may be impacted for many years, depending upon the severity of the impacts to aquatic habitat.

Increases in suspended inorganic sediment (turbidity) concentrations may cause direct fish mortality by increasing the adhesion of particles to salmonid eggs and by causing abrasion, thickening and fusion of gills. Prolonged exposures to concentrations from 200 to 300 parts per million are considered lethal (Gibbons & Salo 1973). It is unknown to what extent, if any, these concentrations may be exceeded due to the effects of timber harvest in JSYU.

Although BLM regulations do not permit the felling or limbing of trees in or across streams, some logging debris is invariably deposited in streams either by logging activities or natural causes. Large accumulations of debris may form check dams that fill with silt, causing loss of food-producing rubble and gravel.

Organic debris may increase biological oxygen demand (BOD) and, therefore, decrease the amount of dissolved oxygen available for fish. If oxygen is severely depleted, fish kills can occur. Dissolved oxygen levels of less than 6 milligrams per liter (mg/l) result in metabolic changes, extreme stress and, if prolonged, death in most salmonid fish (Moring and Lantz 1974). Although no data are available, it is probable that most streams in unlogged environments in the JSYU contain 9 milligrams per liter or greater oxygen concentrations. Organic sediments may also promote the growth of bacteria which attack fish gills, resulting in suffocation. Suspended conifer fibers have also been shown (Kramer and Smith 1965) to inhibit gill functions, thereby reducing survival of young rainbow and brown trout.

<u>Invertebrates</u>. Terrestrial invertebrate populations would be locally impacted by community changes initiated by silvicultural practices. Although habitat requirements are not well understood for many terrestrial invertebrate groups, it can be assumed that invertebrate species composition and population abundance are determined by the diversity of available niches and the quantities of available types of food.

Plant diversity is greatest during the early stages of succession following harvest. Therefore, a greater diversity of live plant-feeding arthropods can be expected in the early stages of succession following timber harvest. Concomitant with the expected increase in diversity of plant-feeding species, the diversity of predaceous invertebrates should increase.

Maximum invertebrate diversity should occur at about 8 to 10 years after clearcutting, in the early shrub/sapling seral stage. Because vegetational stratification is more complex in the early stages following shelterwood silviculture, maximum diversity should occur sooner following the regeneration cut.

Although silvicultural practices may impact local invertebrate populations, impacts to regional populations will be negligible. Most of these populations are astronomically large and capable of sustaining high periodic mortality rates or local outbreak conditions without detectable population oscillations.

More important than the direct impacts of silvicultural practices on invertebrate populations are the impacts of invertebrate population changes on animals that feed on invertebrates. Tevis (1956) showed that the white-footed mouse selected insects as 60 percent of its diet in cutover forest land while only 44 percent of its diet in mature forest habitat. He then concluded that the diversity of insects in cutover land may be at least partly responsible for increased numbers of mice in cutover lands as opposed to mature forests. Hooven and Black (1976) suggest that post-logging population increases in deer mice may also be related partially to the increased availability of insects. Townsend chipmunk population increases may also be partially linked to insect diversity. Tevis (1956) reports that insects represented about 23 percent of this chipmunk's diet. As noted by Hagar (1960) many birds which are most abundant in the early seral stages following timber harvest are at least partly insectivorous. It is probable that some of their population abundance is attributable to increased insect diversity.

Noise Stress

The effects of chainsaw noise on wild animal populations are unknown, but it can be expected that some animals may be sensitive to noise stress. In some cases the stress may be sufficiently severe to force individuals to emigrate, but they should return when it quiets down, provided that other habitat conditions remain suitable for them. Increased noise levels should have no impact on fish or invertebrates.

Long-term Impacts

Alteration of Habitat Conditions

If the proposed management plan were continued for 60 years after its implementation, all the old-growth habitat on high-intensity managed commercial forest lands would be exhausted. In addition, approximately 95 percent of the mature forest habitat would be depleted. Therefore, if all mature and old growth habitats are assumed to be currently of carrying capacity, it can be assumed that virtually all dependent wildlife populations (Table 2-11 and 2-13) would be eliminated.

With the gradual, progressive loss of old-growth, high volume stands, more acres of younger age classes would have to be harvested. This increase in acres to be harvested would create more early seral stage habitat, thereby potentially benefiting animals which are dependent upon it. This increase in amount of habitat cannot be quantified. Similarly, the acreages of pole/sapling and early second-growth habitats would increase as a function

of natural succession through time. These acreages cannot be estimated either. The impacts of increased amounts of these habitats would be negligible except that they would provide cover for some species (including deer and elk). Deer and elk populations, however, could not be expected to increase dramatically because of the population constraints provided by limited amounts of winter range.

3.2.4.2 Yarding/Loading

The impacts of yarding and loading operations on wildlife populations differ with the type of operation and the susceptibility of the animal. The main impact is the skidding of logs, which destroys low vegetation, compacts the soil and alters drainage patterns. As discussed earlier, the intensity of these disturbances differs with the yarding system and the physical environment in which it is applied. The main impacts to wildlife populations include alteration of habitat conditions and noise stress.

Short-term Impacts

Alteration of Habitat Conditions

Impacts to Terrestrial Animals. Yarding and loading practices are probably less detrimental to wildlife habitat than is the cutting of trees, with the possible exception of small rodents and ground-dwelling insectivores. The complete (but temporary) destruction of 5,100 acres of surface vegetation (see Section 3.2.1.2) would lower the amount of habitat for small rodents and insectivores. Shallow soil disturbances that do not remove excessive topsoil may benefit local wildlife populations that depend on early successional communities (elk, deer, graminivorous birds, certain rodents, etc.). Swanson (1970) reported significantly higher elk use on moderately or heavily disturbed sites than on lightly disturbed sites (Bunnell & Eastman 1976).

Log skidding may also damage or destroy individual rodent nests, bird nests or insectivore burrows. The impacts are expected to be minor, due to the mobility of the animals and their abilities to re-nest within a short period of time.

The removal of unmerchantable timber during gross yarding will remove existing and potential snags and forage logs as well as existing pieces of habitat. The resultant elimination of 5,100 acres of habitat would have a significant adverse impact on the organisms which utilized the area but a minor adverse impact in the entire JSYU.

Aquatic

The major physical impacts to fish habitat from yarding and loading result from increased sediment accumulations due to the erosion of skid trails. Skid trails contribute an unknown percentage of the gross amount of sediment load which enters streams as a result of logging operations. In addition to their contributions to gross sediment load, skid trails may also function as downslope channels, accelerating runoff velocities.

As previously mentioned, increases in sediment accumulation may physically impact aquatic habitat by:

a) Reducing inter- and intragravel waterflow, thereby reducing

dissolved oxygen for fish and invertebrates.

b) Providing a physical barrier to the emergence of immature salmonids from spawning gravel.

c) Lowering the production of aquatic plants upon which many invertebrates and some fishes depend for food.

d) Reducing the suitability of stream bottom substrates for the attachment of aquatic macro-invertebrates.

In addition to physical impacts to aquatic habitat, increase in suspended sediments may directly injure fish and aquatic invertebrates by eroding gill membranes (Gibbons and Salo 1973) and facilitating sediment adhesion to the chorion of fish eggs.

Tractor yarding is more injurious to aquatic habitat than cable yarding because it disturbs the soil more.

Increases in turbidity may reduce photosynthesis, alter stream temperature and precipitate organic particles which produce high BOD and lower the availability of oxygen.

Bedload sediments may severely damage fish habitat. Gibbons and Salo (1973) report that: (a) sediment filling gravel interstices reduces the concentration of dissolved oxygen available to incubating salmonid eggs; (b) deposited sediment may physically prevent the emergence of salmonid fry; and (c) sediment reduces food abundance by promoting unstable substrates for aquatic invertebrates and periphyton. It is important to emphasize that the rate of sedimentation is expected to be lower with the proposed action than with the existing management plan. However, bottom sediments would continue to accumulate in streams, thereby potentially increasing the impact of bottom sedimentation.

Timber harvesting increases streamflows, with different silvicultural practices producing different amounts of increase. These increases can be detrimental or beneficial to fish populations. Increased flows cause egg and alvin displacement and mortality as a result of gravel shifting. Benthic algae and insect populations, important as food sources for fish, are killed or displaced by gravel scourings. However, increased flows expand the available habitat for fish, thereby increasing the potential carrying capacity of the stream.

Noise Stress

Yarding and loading operations present a noise intrusion similar to that of silvicultural practices. However, in addition to the on-site noise intrusion, diesel log trucks moving logs away from the harvest site will create noise impacts to animals within earshot of the roads. Although the noise sources will be intermittent, they may be sufficiently severe to prohibit animals from utilizing roadside habitat.

3.2.4.3 Transportation Systems

Road construction, renovation and maintenance present a wide variety of impacts to terrestrial and aquatic animals and their habitats. Most of these impacts are directly related to the elimination of terrestrial vegetation. Terrestrial vegetation is the primary determinant

of terrestrial animal habitat and also exerts the primary influence on the quality of the aquatic environment. The general impacts of road construction, renovation and maintenance include alteration of habitat condition and direct increases in animal mortality and stress.

Alteration of Habitat Condition

Terrestrial

Road construction requires the removal and disposal of all vegetation within the roadway, thus completely removing land within the roadway from vegetative production. Because subsequent renovation and maintenance practices, in addition to normal traffic, prohibit the development of vegetation, the presence of a roadway represents a complete loss of terrestrial habitat for the life of the facility. The 500 miles of roads proposed for construction will decrease the current amount of terrestrial habitat by approximately 4,340 acres, thereby increasing the total amount of habitat displaced by BLM roads in the JSYU from the present 13,000 acres to approximately 17,000 acres. This impact would occur within the short-term time frame but would also be long term in duration.

Although vegetation is eliminated from the roadway, road shoulders often support diverse vegetation communities characteristic of the early successional stages following disturbance of the forest floor and opening of the canopy. Shoulders may also be stabilized by the planting of forbs and browse species palatable to wildlife, further increasing community diversity and value to wildlife. The productivity and diversity of these roadside communities undoubtedly lessens the adverse impacts of the roadway proper. Periodic shoulder maintenance, where performed, keeps the community within the early successional stages beneficial to many species.

Aquatic

Logging roads are the greatest source of man-caused inorganic stream sediments (Gibbons & Salo 1973). As previously discussed, increases in stream sedimentation may: a) reduce inter- and intragravel waterflow thereby reducing the amount of dissolved oxygen available for fish and invertebrates; b) provide physical barriers to the emergence of immature salmonids from spawning gravel; c) lower the production of aquatic plants, upon which many aquatic invertebrates and some fishes depend for food; and d) reduce the suitability of stream bottom substrate for the attachment of aquatic invertebrates. Debris torrents or massive slides may be fostered by road construction in headwall areas and steep side canyons. These occurrences may completely eliminate fish habitat for varying distances downstream. The impacts of such soil movements may persist into the long term.

Increases in Animal Mortality and Stress

Terrestrial

The increases in vegetative abundance and diversity along roadsides would increase animal use, thereby exposing them to increased probabilities of mortality from vehicle traffic. The impacts of these mortalities on animal populations would probably be minor.

Noise levels associated with construction activity would be

relatively loud but of temporary duration. Noise sensitive animals may emigrate from the area until construction is completed. Traffic noises, although intermittent and of short duration, may similarly stress roadside animals and those within earshot of the road.

Logging roads also provide recreation access to areas that were, perhaps, less subject to use before road construction. This increased access may increase wildlife harrassment from hunters, off-road vehicle enthusiasts or other user groups.

Aquatic

Suspended sediment, increased due to road construction activity, may physically injure fish and invertebrate gill membranes and eggs. Laboratory studies summarized by Gibbons and Salo (1973) indicate that prolonged exposure to suspended sediment concentrations from 200 to 300 parts per million (ppm) is lethal to fish. It has been previously determined that a total of 1,488,845 tons of sediment would reach stream channels in the JSYU due to road construction in the proposed action. This compares to a total of 66,940,937 tons for the JSYU as a a whole over the same time period (see Table 3-10). Localized levels of suspended sediment could exceed 200 to 300 parts per million in streams down slope from some activities of the proposed action. Adverse impacts would be greatest during the construction phase and for several years following construction, until road shoulders become adequately vegetated and surfaces stabilize.

3.2.4.4 Development and Protection Practices

Development and protection practices are undertaken to enhance timber production and to protect standing timber from destruction by various agents. The practices are varied and numerous but their major impacts all involve the alteration of animal habitat through vegetative manipulation. The impacts will be discussed for both terrestrial and aquatic animals under operational system headings.

Scarification

Although the impacts of scarification on wildlife populations are not well known, scarification can be regarded as generally shortening the residence time of earlier successional stages by providing conditions conducive to the establishment of coniferous trees. Scarification in the JSYU would temporarily eliminate all the vegetation on 160 acres. The practice, however, does not eliminate earlier seral stages. The seral stages are merely abbreviated. Therefore the impacts to terrestrial animals which prefer early seral stages are still beneficial but the benefits are shorter-lived than if no scarification was undertaken. Bunnell and Eastman (1976) believe that light to moderate disturbance is probably beneficial to terrestrial wildlife because it stimulates vegetative productivity, whereas severe disturbance and compaction reduces the amount and productivity of habitat components. It is also probable that burrowing mammals and soil or litter invertebrates are adversely affected by the soil mixing and compaction that occur with scarification.

It is assumed that scarification also increases sedimentation in aquatic habitats. The impacts of increased sedimentation have been previously discussed.

Scarification is proposed for treatment of only 160 acres in JSYU. Therefore, impacts would be very minor compared to the impacts of more large-scale operations.

Planting

Planting is expected to accelerate early succession by at least 1 year (see Section 3.2.1.4, Planting). This would have the impact of eliminating at least 7 percent (4,700 acres) of the early seral stage habitat in the JSYU within 10 years, based on an average early successional stages duration of 15 years.

Seeding and planting, similar to other site preparation practices, tend to shorten the early successional stages following timber harvest in favor of rapid establishment of commercial tree species. Seeding encourages the short-term proliferation of seed-eating birds and mammals such as the dark-eyed junco and white-footed mouse. Some mice are particularly voracious feeders on Douglas-fir seed. Tevis (1956) reported that mice robbed 100 percent of the Douglas-fir seeds planted in 100 plots, spaced at intervals of 6 feet, in two nights. Similarly, Crouch (1969) reports that deer browsing on young Douglas-fir seedlings can become a problem.

Planting should have no short-term impacts to fish or aquatic invertebrates. Any practice which encourages the growth of terrestrial vegetation should provide a long-term beneficial impact to aquatic habitats by reducing sediment loading of runoff water.

Chemical Weed Control (herbicide treatment)

Terrestrial Animals

Short-term Impacts. There are three major types of impacts to animals associated with silvicultural herbicide application - exposure to toxic chemical levels, habitat modifications, and carrier impacts.

Exposure to toxic levels of herbicides. None of the herbicides proposed for use in JSYU forest applications have been reported to be highly toxic to wildlife, when used as manufacturers' label prescribes.

Many researchers have reported that wildlife are bound to ingest herbicides by consuming contaminated food or water immediately past treatment. However, studies have shown that an animal is unlikely to ingest toxic levels of herbicides from treated forage (Rudd and Genelly 1956; Springer 1957; Mellanby 1967; Montgomery and Norris 1970; and Norris 1971a). Springer (1957) found that test animals are often repelled by herbicide residues on their natural foods, and will not eat freshly treated vegetation if other food sources are available. However, Newton and Norris (1968) found that deer remained and fed in treated areas.

These researchers found that deer feeding on treated vegetation did not accumulate significant amounts of herbicide, even when exposed to maximum field application rates of 2,4-D. Atrazine residues of 2,4-D were found to be less than 0.006 ppm in the muscle tissue of

deer 43 days after exposure. Atrazine residue could not be detected after 44 days. It must be recognized that Newton and Norris (1968) data are not conclusive, but do support the theory that ruminants are able to degrade herbicides and that little bioaccumulation occurs.

Much of the general toxicity attributed to 2,4,5-TP (silvex) appears to be caused by the contaminant TCDD (dioxin). A general insufficiency of knowledge exists on the effects of field use of herbicides containing TCDD and the resultant impacts of residues on wild animals.

Pimentel (1971) and Witt and Baumgartner (1973) report that dicamba presents no hazard to man and low toxicity to wildlife. The U.S. EPA (1974a) reports that dalapon has a short residual life and has low mammalian toxicity. The agency also reports that simazine has low toxicity to mammals, however, it does have some residual life.

Generally, herbicides have been found to be less toxic to birds than other pesticides: most acute toxicity LC_{50}s (lethal concentration for 50 percent of the test population) to birds tested were greater than 5,000 parts per million. However, literature on the sub-lethal effects of herbicides on birds is limited.

The acute oral toxicity of 2,4-D fed daily to chicks for 28 days was found to be low (Tschirley 1970). Kopischke (1972) reported that spraying of pheasant eggs with 2,4-D at a concentration comparable to those of a normal field herbicide treatment, did not affect hatchability of eggs or cause death or deformity in hatched chicks. It is reasonable to anticipate that result can be related to comparable birds of the forest.

Dalapon is relatively non-toxic to quail, pheasants and ducks. However, dalapon appeared to depress reproduction of ducks when they were fed levels of less than 25 percent of those which produced mortality.

Beaver (1976) found that birds in herbicide treated areas shifted their diets and used alternative food sources. This factor may have been due to the loss of food plants rather than its contamination.

The effect of herbicides on native insect populations has not been studied; however, the effect of 2,4-D on bees has been studied by a number of researchers. When 2,4-D dust was applied directly to bees and to the crawl space at hive entrances, neither the adult bees nor the brood were adversely affected (Palmer-Jones 1964). Brydy (1962) reported total mortality of bees within 4 days of feeding with 30 micrograms of 2,4-D and 10 percent mortality within 3 days with 20 micrograms. Johansen (1965) reported that 2,4-D and related compounds were not toxic to bees, except when formulated as alkanol-amine salt or the isopropyl ester (USFS 1977c).

Morton et al. (1972) fed herbicides in 60 percent sucrose syrup at concentrations of 0, 10, 100, and 1,000 parts per million by weight to newly emerged worker bees, *Apis mellifera*. Silvex, 2,4-D and dalapon were relatively nontoxic to honey bees at all concentrations (Ibid.).

Reptiles, amphibians and other organisms with limited mobility may not be able to avoid the herbicide treatments. Quantitative data is

lacking on the impacts on these vertebrates and invertebrates. Stream buffer zones provide protection to the aquatic animals. Most amphibians and reptiles live beneath protective cover which intercept most of the spray.

A summary of toxic levels of various herbicides to mammals is presented in Table 3-17 and a similar summarization is presented for birds as Table 3-18. Data are insufficient to speculate on the impacts of herbicide application on resident wildlife in the JSYU.

Table 3-17

Toxicity of Herbicides to Mammals

	Chemical	(Oral) (Dose)	LD_{50} 1/	Source
Rat	Silvex		30 mg/kg	House et al. 1967
Rat	Krenite		24,400 mg/kg	USFS 1977c
Mammal	2,4-D	(yes)	375-700 mg/kg	Witt & Baumgartner 1973
Rat	2,4-D	(yes)	666 mg/kg	Spector 1956
Mouse	2,4-D	(yes)	375 mg/kg	Spector 1956
Rabbit	2,4-D	(yes)	800 mg/kg	Spector 1956
Dog	2,4-D	(yes)	100 mg/kg	Spector 1956
Guinea pig	2,4-D	(yes)	1,000 mg/kg	Spector 1956
Mule deer	2,4-D	(yes)	400-800 mg/kg	Tucker & Crabtree 1970
Mammals	Silvex	(yes)	650 mg/kg	Witt & Baumgartner 1973
Mammals	Atrazine		1,750-3,800 mg/kg	Witt & Baumgartner 1973

1/ LD_{50} = lethal dosage for 50 percent of the sampled population.

Carrier Impacts. Diesel oil is often used as a carrier (i.e., herbicide dilutant) for forest herbicide treatments with silvex and 2,4-D. It is estimated that from 90,000 to 360,000 gallons of diesel oil would be required for herbicide application in the JSYU.

Data on the toxicity of diesel oil on wildlife is limited. However, a few studies have been conducted on the adverse effects of diesel oil on ducks. The acute oral LD_{50} to male and female mallards, greater than 12 months in age, is given as greater than 20 milliliters per kilogram (Tucker and Crabtree 1970). In this study none of the animals died at the highest dosage given (20 ml/kg). This acute oral LD_{50} for healthy white ducks was found to be greater than 24 ml/kg (Hartung and Hunt 1966). This quantity is far higher than a duck would consume with foliage sprayed during a normal forest application of herbicide. A bird may also ingest some diesel oil by preening itself after being exposed to spray. It was found that a duck ingested through preening about one-third of the oil sprayed on its feathers (Hartung 1965).

Table 3-18

Dietary Toxicities of Herbicides Tested in Five-day Diets of Young Bobwhites, Japanese Quail, Ring-necked Pheasants, or Mallards (1964-73)

Compound / Species	Age (days)	No. of conc.	No. birds/ conc.	LC_{50}	Toxicity Statistics (95% C.L.)	Slope	(S.D.)	RTD	(95% C.L.)
Dalapon, sodium salt									
Japanese quail	12	3	14	5000	(No mortality to 5000 ppm)				
Ring-necked pheasant	10	3	8	5000	(No mortality to 5000 ppm)				
Mallard	10	3	10	5000	(No mortality to 5000 ppm)				
Atrazine									
Bobwhite	9	3	10	5000	(No mortality to 5000 ppm)				
Japanese quail	7	3	14	5000	(No mortality to 2500 ppm, 7% at 5000 ppm)				
Ring-necked pheasant	10	3	8	5000	(No mortality to 5000 ppm)				
Mallard	10	3	10	5000	(No mortality to 2500 ppm, 30% at 5000 ppm)				
Silvex (2,4,5-TP)									
Japanese quail	12	3	14	5000	(No mortality to 5000 ppm)				
Ring-necked pheasant	10	3	8	4500	—		96		—
Silvex, butoxyethanol ester									
Bobwhite	14	3	10	3031	(2441-3774)	10.808	(3.945)	113	(84.2-160)
Japanese quail	14	3	16	5000	(No mortality at 1250 ppm, 6% at 2500 ppm, 12% at 5000 ppm)				
Ring-necked pheasant	10	3	8	2100	—		44.7		—
Mallard	10	2	8	5000	(No mortality to 5000 ppm)				
2,4-D, dimethylamine salt									
Bobwhite	23	2	7	5000	(No mortality to 5000 ppm)				
Japanese quail	20	4	20	5000	(No mortality to 5000 ppm)				
Ring-necked pheasant	10	3	8	5000	(No mortality to 5000 ppm)				
Mallard	17	3	8	5000	(No mortality to 5000 ppm)				

Source: Fish and Wildlife Service - Wildlife Report No. 191

The use of heavy amounts of diesel oil could possibly adversely affect the hatchability of eggs that are sprayed. An oil coating on the eggs will block gas exchange through the shell and the embryo will die. In one study 57 viable pheasant eggs were sprayed with diesel oil to runoff, none of the eggs hatched (Kopischke 1972). This is a far larger amount of spray than the eggs would receive in a normal forest application. In another study fertile chicken eggs were sprayed with diesel oil at the rate of 10 gallons per acre, none of the eggs hatched. Further studies showed that just coating the large end of the egg with diesel oil was adequate to kill the embryo (Keith 1964).

Because the dormant sprays, using mostly diesel oil as the carrier, are applied early in the year, they are not expected to interfere with the nesting success of oviparous wildlife species. Most birds place nests in sheltered areas to protect them from predators. Also, if birds nests are aborted early in the reproductive period, most species will renest. Of the forest animals, birds may be the most susceptible to the impact of oil used as a herbicide carrier.

Any bird accidentally receiving a complete soaking during a herbicide application could lose the ability to fly. Loss of flight capabilities subjects the bird to predatory animals.

A secondary, but important impact of oil on birds feathers, is the loss of structure caused by matting. Birds which flush or fly directly below an airplane may receive a complete wetting of spray. Matted feathers provide no insulation characteristic, thus a bird can become susceptable to hypothermia, or rapid heat loss. Early spring applications of herbicides are the most critical to birds, because of coinciding cool weather. A combination of factors reduces the possibility of birds from being contaminated with oil, these include; the small amount of oil carrier used per acre, the volitilization of a portion of the sprays, and the natural feature of overhanging vegetation intercepting most herbicide. Also, birds are mobile and may flush prior to the arrival of the treatment aircraft, due to the noise factor.

In summary, data are insufficient to accurately predict the impacts of diesel oil carrier on populations of animals in the JSYU.

Habitat - Modification Impacts. Herbicides have pronounced impacts on wildlife habitat. These impacts are brought about by losses of habitat diversity and stratification. The harvest of timber initiates secondary plant succession (see Section 3.2.1.1). Herbicide application, in addition to other development practices, alters the natural rate of successional progression. It is generally recognized that wildlife population responses to herbicide application are largely a function of resultant changes in plant succession and not the herbicide treatment directly.

Herbicide treatments can be used to advance or retard the successional stage of a plant community. The objective of herbicide treatments used in the forest development program is to reduce or retard vegetative growth competing with conifer establishment by either

advancing or shortening the time period of the early successional stages. The successional stages in which herbicide treatment has the most accelerating effect are the grass/forb, shrub/seedling, and pole-sapling stages. The grass/forb and shrub/seedling stages are especially important to a variety of wild animals in the JSYU (see Tables 2-11 and 2-12), including all of the major game species. Although herbicide treatments generally only temporarily eliminate certain brushy or herbaceous components, the reduction in forage availability may adversely impact animal populations.

Several authors have concluded that herbicide treatments generally provide improved habitat for the larger game animals. Black (1970) found fewer small mammals and birds on treated sites after the vegetation was decreased by herbicides which reduced the available cover, and as the vegetation recovered, so did the animal populations. Conversely, deer use increased on treated areas, 1 year past treatment, in a greater proportion than on untreated areas.

In other studies, Black and Hooven (1974) found that herbicide effects on small mammal populations in the mixed conifer region of southwestern Oregon was somewhat different. Populations remained similar between treated and nontreated plots except for pocket gophers, which decreased on treated sites.

Borrecco (1973) reported differential responses of mammals to herbicide treated areas in the Douglas-fir region of western Oregon. Meadow voles, vagrant shrews and jumping mice decreased while deer mice and trowbridge shrews increased. Black-tailed deer use increased on the treatment areas. These population changes were related directly to habitat modification which was characterized by elimination of annual grasses, partial reduction of forbs and perennial grasses and temporary suppression of browse species. Follow-up studies on Borrecco's plots by Black and Hooven (1974) showed that within 2 years or less, treated habitats had returned to normal, and composition of small mammal communities on treated plots was similar to untreated plots.

In California, Savidge (in press) found that 6 years following the herbicide spraying of a pine plantation, changes in the shrubby vegetation depressed nesting bird populations, altered species diversity, and depressed summering mule deer populations, but stimulated an increase in some rodent populations.

Harper (1971) reported that elk were adversely affected when ground forage was removed by herbicides, but were benefited by opening up of dense brushfields. In this study, many of the mature shrubs were not killed but just set back by herbicide treatments and many resprouted proving excellent forage for deer and elk. Harper warned that increased tree browsing may result when preferred browse species are removed.

Mueggler (1966) used a mixture of 2,4-D and 2,4,5-T in northern Idaho to determine the impacts and opportunities to improve wildlife habitat. Contrary to Harper's findings, Lyon and Mueggler (1968) found that the long-term impact was a lag in plant mortality of undesirable species. Desirable species exhibited poor persistence of sprouting and quick recovery from

crown dieback. Plants with crown dieback tend to basal sprout more readily. Redstem ceanothus (Ceanothus sanguineus), the most desirable browse, was killed by all treatments.

Some of the cut-over coniferous forest land in the JSYU tends to proceed to a brushy stage of brush with a dense canopy reaching 10 or more feet off the ground. Wildlife forage is practically unavailable under this type of vegetative structure because the palatable forbs and browse are shaded out. Plants growing under a dense canopy, in limited sunlight, have reduced nutritive value than those growing in the earlier grass-forb successional stage. Therefore, the overall effect of herbicide treatments used in most forest applications is usually the shortening of the grass-forb stage in favor of a general advancement of the pole/sapling and young second growth stages. During the period after conifer release forbs flourish for a few years until brush or conifers invade and shade out other vegetation.

Herbicide treatments do not remove all the vegetation; a variety of untreated remaining plants still provide forage. However, the range of selectivity of some herbicides proposed for use is only moderately described in the literature. Response of non-target vegetation, such as forbs, is not well documented. Quite often the vegetation which the forest manager seeks to destroy or retard is a preferred wildlife forage item. All herbicide target species (see Section 1.6.4.1) are utilized to some extent by wildlife as forage items, while others are used for nesting sites and cover.

Production of grasses would be reduced on a total of about 22,000 acres in the JSYU scheduled for treatments with atrazine or dalapon singly or in combination with other herbicides. Production of herbaceous and shrubby vegetation would be reduced on all 47,700 acres proposed for herbicide treatment.

Treatments would therefore lower the maximum amount of forage that would normally be available under natural succession. However, the 250 percent increase in the amount of early successional stage habitat that would be provided by the proposed management plan should more than compensate for any temporary loss of vegetative production. In other words, although herbicides would lower the productivity of early seral habitat, the acreages of these habitats would still be greater than those levels existing in 1976.

Long-term Impacts.

The major long-term impact of herbicide treatment to terrestrial animals is possible bioaccumulation of TCDD. The term "bioaccumulation" refers to the uptake and storage (temporary or long term) of a chemical by an organism. These organisms would then carry possibly toxicologically significant residues as food sources for other creatures. For instance, the amount of TCDD required to produce harmful effects in humans is spread out over such an area that direct personal exposure to that amount is unlikely. But if deer bioaccumulate TCDD as they feed, human consumption of these deer could conceivably lead to significant human exposure. The same relationship holds true for lesser prey species and predators.

The degree of bioaccumulation depends on the magnitude and duration

of exposure but available data (Rose et al. 1976; Piper et al. 1973; Fries and Marrow 1975; Matsumura and Benezet 1973; Young et al. 1976; Allen et al. 1977) indicate that most animals will accumulate TCDD in certain body tissues, at least for as long as exposure continues.

The significance of minor amounts of TCDD bioaccumulation is uncertain. However, recent experiments with primates (Allen et al. 1977) indicates that cumulative sub-lethal doses of TCDD may result in death if a sufficient number of doses is received. In other words, these experiments indicate that the end result of exposure to lethal amounts of TCDD is the same, regardless of whether the dose is received in one exposure or cumulated after numerous small exposures.

Evidence opposing the cumulative effect is presented by Voss et al. (1973) and Voss and Moore (1974) with guinea pigs and rats. Data are insufficient at this time to accurately speculate about the possible cumulative toxic effects of TCDD in humans or other animals which might come in contact with spray materials containing the substance.

Although 7,250 to 21,750 pounds of silvex (which contains TCDD) are proposed for application in the JSYU, the amount of TCDD would be small and spread over such a large area (29,000 acres) that animal exposure to a single toxic dose would be highly unlikely. Additionally, TCDD as it occurs in actual herbicide formulations generally degrades in 1 day, further decreasing the possibility of an animal contracting a single dose.

A "worst case" possibility, of course, always would exist that, through some catastrophe or error in application, lethal animal limits would be exceeded for a temporary period of time in the treatment of portions of the area. In such circumstances animal mortality would occur.

Aquatic Animals

Herbicides can be acutely toxic if concentrations in the aquatic environment exceed sub-lethal levels. The concentration of herbicides lethal to aquatic organisms is variable depending on such factors as pH, hardness of the water, temperature, oxygen content and flow level. All of the anticipated impacts to aquatic organisms involve toxic concentration of herbicides in water. Additional information would be required to identify impacts of sub-acute levels of toxicity on aquatic organisms and their habitats. Without such information it is impossible to speculate on long-term impacts to the organisms or their habitat.

The Environmental Protection Agency (U.S. EPA 1977a) has determined that the following general factors influence impacts to aquatic organisms in stream environments:

1. Lower maxima are appropriate for extended exposure than for short-term peaks with the same safety factors in use.

2. Concentrations change slowly in large streams, and a greater chance for chronic exposure occurs from a given concentration.

3. Large streams at elevated concentrations elute larger amounts of chemical into the next larger stream than feeder streams of the

same concentration, thus creating more general pollution problems for a given level of contamination (U.S. EPA 1977a).

4. Large streams contaminated at high levels offer little escape opportunity for organisms.

5. Sustained high levels of contamination, as might be associated with pollution of larger rivers, offer maximum opportunity for biomagnification of compounds having this tendency.

Table 3-19 presents data concerning observed toxic levels of herbicides, by aquatic organism, based on laboratory (aquarium) studies. In view of the facts that aquarium data may not be directly applicable to field conditions and that organisms tested may not indicate general tolerance levels for all aquatic organisms, researchers have recommended that maximum stream concentrations not be allowed to exceed the levels determined toxic for the most sensitive aquatic organisms.

Data presented in Table 3-19 indicate that most herbicides would probably have to exceed the 1.0 ppm concentration to become lethal to the aquatic organisms tested. Field results in Coos Bay BLM District, where silvex and 2,4-D were applied in 1977, indicated that of the 11 streams which were intensively monitored, 9 were found to contain amounts of herbicide ranging from less than 0.001 ppm of silvex at some point within a 72-hour period. These streams were all protected with bufferstrips (Cameron and Anderson 1977) as would those in the JSYU.

TCDD (dioxin) has been found to be extremely toxic in relatively small concentrations in the aquatic environment (Miller et al. 1973). In addition, a serious lack of knowledge exists concerning the effects of bioaccumulation of minute quantities of TCDD in the environment. It is impossible to speculate on the levels of TCDD which might be expected to occur in streams within the JSYU.

In summary, based on concentrations of herbicides observed following spraying operations on BLM forests near Coos Bay, it is improbable that herbicide concentrations in JSYU streams would exceed the "no effect" level (0.1 ppm) following herbicide application. This "no effect" level provides an estimated ten-fold margin of safety for most species which were tested by various laboratory researchers. Tolerance limits are not known for most of the species in the JSYU but it is assumed that concentrations of herbicide which do not exceed 0.1 ppm would have little noticeable effect on the majority of species.

However, it is possible, under "worst case" situations, that EPA recommended maximum stream concentrations could be temporarily exceeded as could lethal levels of many aquatic organisms. The highest possibility of this type of contamination would occur during spring or winter applications due to increased surface flows and the limited amounts of foliage available to intercept the herbicide.

The impacts of dioxin (TCDD), a contaminant of 2,4,5-TP (silvex) are impossible to predict for aquatic environments in the JSYU. Minor amounts of the substance would enter the aquatic environment where it

Table 3-19

Effects of Common Forest Herbicides on Aquatic Organisms and Recommended Maximum Concentrations

Compound	Test Organism	Dose in ppm/Effect	Stream Concentration Recommended maximumn	Reference
2,4-D	Bluegill	3.0/48hr. LC_{50}	0.03 ppm	EPA 1977
" Dimethylamine	"	166-458/48hr. LC_{50}		Lawrence 1969
" Isooctyl Ester	"	8.8-59.7/48hr. LC_{50}		"
" Butyl Ester	"	1.3/48hr. LC_{50}		"
" Isopropyl Ester	"	1.1/48hr. LC_{50}		"
TCDD (Dioxin)	Coho Salmon	No effect 96hr. .000000056 mg/1	.000000006	EPA 1977
2.4,5-TP Silvex	Chinook	1.2/48hr. LC_{50}	0.01 ppm	EPA 1977
" PGBE Ester	Bluegill	25.0/48hr. TL_m		Hughes & Davis 1963
" PGBE Ester	Fish (saltw.)	0.36/48hr. TL_m		Butler 1965
" Butoxyethonal	Bluegill	2.0/48hr. TL_m		Hughes & Davis 1963
" Triethylamine	Bluegill	20.0/48hr. TL_m		"
" Isooctyl Ester	Bluegill	5.0/48hr. TL_m		"
Atrazine	Crustacean	1-10/48hr. TL_m	0.1 ppm	Thut & Haydu 1971
	Fish	1-10/48hr. TL_m		"
(Triazines)	Daphnia	1/48hr. LC_{50}	(triazines)	EPA 1977
Krenite	Bluegill	670/LC_{50}	5.0 ppm	EPA 1977
"	Rainbow Trout	1000/LC_{50}		Du Pont 1976
"	Fathead Minnow	1000/LC_{50}		"
Dalapon (Dowpon)	Daphnia	11/48hr. LC_{50}	0.1 ppm	EPA 1977
"	Bluegill	115/24-48hr. LC_{50}		Cope 1965
"	Bluegill	105/96hr. LC_{50}		"

LC_{50} = lethal concentration for 50% of test population.
TL_m = Tolerance level for population median.
ppm = Parts of chemical per million parts of water: chemical mixture.

would proabably bioaccumulate to some extent in the aquatic food chain. The impacts of this bioaccumulation are unknown.

Fertilization

Very little information is available on the effects of forest fertilization on animal populations. It may be speculated however, that fertilization increases the palatability of certain plants, including Douglas-fir and various shrubs and forbs. However, fertilizer would be applied to the forest after herbicide application has destroyed much understory vegetation and/or after forest succession has progressed beyond the shrub/sapling stage. Therefore, the net effect of forest fertilization on terrestrial wildlife may be insignificant. Fertilization reduces the amount of time that is required for the managed forest to reach commercial age. It encourages tree growth and the advancement of later successional stages. The trees would be harvested, however, before old-growth community structure has time to develop.

Fertilizer accumulations in runoff water may increase nitrogen levels in streams and ponds of the JSYU. Significant additions of nutrients may accelerate eutrophication in some streams or ponds by increasing the growth of aquatic vegetation and increasing BOD. These effects would be most obvious in stream pools or ponds, especially if streamside vegetation has been removed, allowing the water to warm.

Precommercial Thinning

Precommercial thinning, although it may open a young forest canopy, generally does not beneficially impact deer and elk because the unremoved slashings impede movements. Therefore, the obstacle presented by slash accumulations prevents deer and elk from utilizing any forage increases which result from the thinnings. Cover access is also prevented by slash accumulations. Assuming that all the areas to be precommercially thinned would prevent deer and elk utilization, this practice would result in the removal of 14,200 acres of potential deer and elk hiding cover.

Conversely, birds and small mammals may increase their use of an area following precommercial thinning. Slash accumulations provide cover for them and any increases in forage production can be utilized.

Precommercial thinning, therefore, may be viewed as a beneficial practice for small mammals and birds. It is detrimental to larger herbivores only in that it may decrease their access to hiding cover. Forage quantity for large herbivores is generally lacking in unthinned young growth stands. Therefore, slash accumulations which prohibit access to increased forage abundance do not represent an adverse impact to wildlife forage. Precommercial thinning should have no measurable impact on populations of aquatic animals.

Fire Exclusion/Suppression

The exclusion and/or suppression of fire reduces the potential amount of land that could be available for wildlife which prefer early successional stages. In other words, fire suppression has no direct impact on the current amount of early seral habitat. As previously discussed, a great diversity of wildlife prefer

the early successional stages which result after the removal of forest canopy. This canopy removal not only occurs with logging but also with blowdowns and wildfire. Complete fire suppression (if it were possible) would have the same effect on wildlife that cessation of timber harvest would: the potential land that would ordinarily be available as habitat would diminish. Because complete suppression is not a reality, fire suppression and control activities reduce the potential amount of early seral stage habitat that would otherwise be provided by periodic uncontrolled wildfire.

Conversely, fire suppression and/or control also help to preserve old-growth habitat. This will potentially benefit wildlife populations restricted to old-growth habitat on lands outside the commercial forest base. The beneficial aspects of fire suppression to animal populations, of course, depend on the uncertainty of fire occurrence (i.e., perhaps no fires would have occurred anyway).

Fire suppression or control would have only short-term effects on wildlife habitat within the commerical timber base. Logging disturbances, as previously described, would be sufficient to provide early successional stage habitat while mature forest habitat will be removed by logging operations.

Silvicultural Control of Insects and Disease

Silvicultural control involves the cutting and disposal of insect- or disease-infested trees left standing, many of these trees would provide the dead tree ("snag") habitat for future generations of dependent wildlife. There are approximately 40 species of wildlife indigenous to southwestern Oregon which are directly associated with the specialized habitat provided by snags. There is a natural succession of decay following the death of a tree. Because of these decay processes all dead trees must eventually fall, with or without forest management practices. The removal of dead or dying trees, although important from a silvicultural standpoint, eliminates these trees from succeeding populations of snags which would otherwise have replaced their fallen predecessors. If no new snag habitat becomes available, the implications to snag dependent wildlife are obvious. The northern spotted owl, a threatened species (Oregon list) occurring in the JSYU, is dependent on snag habitat in old growth forests.

Silvicultural control techniques are designed to prevent major insect outbreaks. These techniques probably have little effect on residual insect populations. The major impact on insects is that the control techniques help prevent the sporadic population fluctuations that occur during outbreak conditions. These outbreak conditions may be important to populations of woodpeckers and other insectivorous birds.

Silvicultural control practices should have no effect on aquatic invertebrates unless the logging methods used for the removal of infested trees are injurious to the watershed which, in turn, impacts aquatic habitat.

3.2.4.5 Animal Conclusions

The most significant impacts to terrestrial wildlife will be the

elimination of old-growth habitat and concomitant declines in populations of dependent species. Continued long-term forest management in the JSYU would not allow succession to replace lost old-growth habitat.

Corollary to short-term declines and long-term elimination of old-growth habitat is a significant increase in early seral stage habitat. The short-term impact would be significantly favorable for many dependent small game and non-game populations but probably insignificant for large game populations. The significance of proposed herbicide treatment on animal populations is unknown.

Probably the most significant impact on aquatic animals is physical habitat alteration. This impact is impossible to quantify due to the non-site specificity of the proposed action and the unpredictability of sediment deposition in streams. Nonetheless it is felt that the impact would be significant and adverse because timber harvesting is known to increase stream sediment loading and the majority of stream habitats in the JSYU are known to be currently in poor to fair condition with the amount of available habitat decreasing. Potential for adverse impacts would be greater in headwaters and small streams than in the mainstem of the Rogue River. It must be emphasized, however, that the rate of habitat decline would be lower with the proposed action than if the existing timber management plan were continued.

3.3 SOCIAL ENVIRONMENT

Some timber management activities increase success in or availability of certain recreation pursuits, such as hunting, berry-picking and other dispersed pursuits. Other timber management activities impair the quality of some recreational experiences, particularly those that are oriented toward appreciation of the natural beauty and solitude of the forest.

Many timber management activities change surface vegetation, disturb the soil or build roads or other facilities, creating contrasts to the contiguous environment. BLM's proposed land-use plan for the area requires that timber management activities be conducted so that visual impacts are minimized.

Prior to ground-disturbing activities, the BLM thoroughly surveys project areas to identify and evaluate all cultural resources within the area. Due to dense vegetation and accumulated forest duff, however, some archeological sites would not be discovered before logging begins. In the course of road construction and logging, some unidentified archaeological sites could be inadvertently damaged. Road construction would ease access to, and increase adverse impacts on, any paleontological, archaeological and historical sites near the roads.

Forest recreationists and others in the vicinity of timber management activities would be adversely affected by asociated noises. Although these noises are only temporary, they are often loud.

The herbicide application element of the proposal may have adverse impacts on human health.

Socioeconomic impacts related to timber sales will not be fully realized for at least 4 to 5 years

after a new allowable cut is approved, due to the 3-year life of timber sale contracts then outstanding. Even after that time the impacts on national softwood supplies, lumber prices, and housing costs would be minor.

Compared to the direct timber-based employment projected for 1980, an employment reduction of more than 280 jobs would be expected to follow the proposed lower harvest level (210 jobs lower if compared with 1973-75 levels). In Josephine, Jackson and Douglas counties, the projected employment reductions would amount to less than 1 percent of total employment. The decrease in aggregate personal income of resident workers and proprietors is projected to be 2.3 to 4.4 percent in Josephine, less than 1 percent in Jackson, and 0.4 percent to 1.5 percent in Douglas County. Induced emigration from the three counties might be as much as 300 persons but probably would be markedly less.

If the proposal were implemented, annual public revenue for all O&C counties would be expected to decline about $3.3 million below that projected (based on current management) for 1980 based on recent stumpage prices. O&C payments dependent on the JSYU, however, would be about $3 million more than during 1973-75. Josephine County would receive some $400,000 less than projected under current management. To compensate for this reduction, Josephine County would need a property tax rate increase of 50 cents; and Douglas County, 42 cents per $1,000 assessed valuation. In view of the trend in timber stumpage prices, however, a decline in O&C payments below recent levels is not expected.

Market instability and technology adjustments, however will cause recurrent short-term cyclical fluctuations in timber-based employment in excess of that attributable to the proposed reduction in timber sales from the JSYU.

3.3.1 Recreation

While some recreation seekers may benefit from timber management practices, others may be adversely affected. This section will analyze the beneficial and adverse impacts of logging systems and other activitites.

3.3.1.1 Silvicultural Practices

The creation of clearcut units within the forest will provide openings for wildlife which would benefit the hunter and photographer. Natural vegetation invading a clearcut unit would benefit the berry-picker. Areas for dispersed recreational use would be created as a result of clearcutting. Approximately 5,000 acres would be clearcut.

Outdoor recreationists seek not only activity but also esthetic, emotional, spiritual, and intellectual challenges (Journal of Forestry 1968). Driver (1975) defines recreation as an experience, and recreation demand is defined in terms of preferences for specific satisfying experiences that are desired, expected, and sought from the chosen activities. The recreationist that enjoys experiencing a pristine environment would be affected by areas where timber harvest is apparent. Worst case visitor-day reduction or percentage of population affected is examined later in this analysis.

Shelterwood cutting and commercial thinning would have less adverse effect than clearcutting upon recreationists who value appreciative uses of the natural environment. This category of recreationist participates in activities or enjoys knowing opportunities exist for the participation in activities directed toward appreciation and preservation of environmental features (i.e. seeing natural scenery on foot or horseback, climbing, birding, nature study, and photography). Alteration of the environment would not be as widespread or apparent. Shelterwood cutting and commercial thinning could also leave trails for hikers. Approximately 50,000 acres would be shelterwood cut, and about 4,700 acres would be subjected to commercial thinning.

3.3.2.2 Yarding and Loading

Yarding and loading alter the recreational experience by creating noise and odors. Tractor yarding has the potential for the most impact, and approximately 23 percent of the proposed allowable cut would be tractor yarded. Ground systems of yarding and loading could also produce areas for hiking as a result of the movement of felled timber over the ground's surface. Cable yarding of approximately 77 percent of the proposed allowable cut would create similar impacts to a lesser degree.

3.3.1.3 Road Construction, Renovation, Maintenance

The proposal calls for the construction of 500 miles of permanent road, affecting 4,340 acres. The creation of access to additional land would provide more opportunities for dispersed recreation. The construction of new roads may attract more people which would adversely impact resources in specific heavily-used areas. As existing facilities and the environment deteriorate, the quality of the recreational experience would be impaired. In many areas, however, new roads would serve to disperse recreationists and reduce the present level of impacts upon facilities and recreational experience.

Recreational use is projected to increase in proportion to the total number of future recreation users. A demand increase of 103 percent has been indicated for camping, picnicking, fishing, and hunting between 1970 and 1990 (Oregon Department of Transportation 1972). Demand for other specific recreational activities is forecast to increase to a similar extent. These figures are based upon the assumption that present trends will continue. The degree of impact would therefore increase commensurably as recreational use increases.

Extending the network of logging roads could possibly decrease recreational enjoyment by creating additional traffic, noise, dust, fumes, and decreased visibility. Also, the recreationist could become lost if new roads are not mapped and signed. Approximately 500 miles of new road affecting approximately 4,340 acres would be constructed.

Perhaps the most significant impact of road construction is access to new areas for dispersed recreational opportunities. Roadless area users might also benefit by gaining quicker and greater ease of access to undeveloped area trailheads. In any case, as timber harvest and associated road construction create additional potential for dispersed recreation, the impacts of human waste disposal

and ORV use would also become apparent. Litter, garbage, sink wastewater, and biological waste from humans and their pets could affect water quality and the recreational experience of others. The magnitude and seriousness of environmental, health, and esthetic impacts of waste disposal from dispersed recreation are not yet clear.

More dispersed recreation would cause increased fire hazard during times of peak use. The need for additional fire preventive measures, signing, and facility development may become apparent as recreational user patterns change.

3.3.1.4 Cumulative Impacts of Timber Management Activities

Most timber management activities alter the recreational experience. Timber harvest and accompanying road construction, traffic, and noise severely impact recreational values. The impact of noise is dealt with separately in Section 3.3.4. Practically all timber management practices create evidence of human presence by disturbing previously undisturbed forest areas. Each year, approximately 50 percent of the cutting, or 250 acres of clearcut and 2,500 acres of partial cut would be new ground, previously undisturbed by humans. The serenity and solitude afforded by a visit to an undeveloped forest area is lost. A reduction in recreation visitor days may result from this deterioration of the recreational environment.

It can be generally stated that any activity adversely affecting the recreational experience will cause a reduction in the number of visitor days. In a study of the relative importance of selected "demand expectations" of four test groups of Michigan recreationists in 1971, Driver (1975) found that the desire to experience nature is valued highly by social campers and backcountry campers. The desire to experience nature was not as great for trail bikers. Table 3-20 summarizes similar study (Knopf 1972) of ten different recreation groups. Insofar as timber management activities limit recreationists from achieving that desired and expected consequence, impacts can be quantified. In the worst possible case (if all campers were to decide not to camp within the non-Rogue River portion of the JSYU because they believe the opportunity to experience nature would be foregone as a result of timber management operations) a loss of approximately 10,000 visitor days would accrue.

In 1975 about 52 percent of the total population of Josephine County could be expected to participate in camping. It was found that 70.37 percent participated in picnicking (Oregon Department of Transportation 1976a). Recreational activities and their environments impacted by timber management activities could inherently impact in the worst case that percentage of the total population participating in those activities.

Hendee et al. (1971) systematically grouped a number of recreational activities into five conceptually linked categories. Each category was named according to the general type of motivation it fulfilled:

1. Appreciative-symbolic activities are directed toward appreciation and preservation of environmental features. For example, recreationists typically would experience nature on foot or on

Table 3-20

Mean Scores of Ten Different Test Groups of Michigan Recreationists to the Expected Consequence of Experiencing Nature

Test Group	Importance of Experiencing Nature[1/]
Backcountry campers	7.8
Backcountry hikers	7.6
Social campers	7.5
Trout fishermen	7.3
Picnickers	7.0
Warmwater fishermen	6.8
Sail boaters	6.2
Trail bikers	5.8
Golfers	5.0
Tennis players	2.7

[1/] Responses were to a 9-point scale format on which extremely important was coded 9 and not at all important was coded 1.

Source: Knopf 1971, pp. 111-113.

horseback rather than from a car or train. Activities would be preferred in settings where crowding and manmade facilities were not common. These would include seeing natural scenery on foot or on horseback, rock climbing, mountain climbing, birding, nature study, and photography.

2. Extractive-symbolic activities are characterized by the quest for "trophies" extracted from the natural environment - fishing, hunting, and rock and shell collecting.

3. Passive free-play activities would require relatively little physical effort. The setting for them would not necessarily be natural or near-natural. Levels of use could be moderate to high. Considerable latitude would be possible for developing convenience facilities and opportunities for social interaction among participants. Activities include relaxing, sunbathing, reading, sightseeing from the car, and quiet boating or canoeing.

4. Social learning. This category includes activities in which major motivation is to socialize. Because social interaction is a principal source of satisfaction, relatively high levels of use and manmade facilities often are common. A high degree of naturalness of the environment is not required. Two classes of activities can be identified: (1) social activities, such as visiting with others, and (2) learning activities in groups, such as visiting exhibits and hearing nature talks.

5. Active-expressive. These are activities where the emphasis is on physically strenuous activity

for its own sake. Thus, a natural or natural-appearing setting is not required. Social interaction is a major source of satisfaction and manmade facilities often are common. Activities include motorcycle riding, water skiing, downhill snow skiing, swimming, boat racing, snowmobiling, and playing outdoor games.

These researchers point out that passive free-play, social learning, and active-expressive activities do not require natural or near natural settings. Timber management activities would therefore result in impacts primarily to the recreational setting enjoyed by persons participating in appreciative-symbolic and extractive-symbolic activities. Within Josephine County the percentage of the population that participates in these types of activities follows:

Appreciative-Symbolic	
1. Hiking (to see natural scenery)	29.36
2. Horseback Riding (to see natural scenery)	6.61
3. Rock Climbing	no data
4. Mountain Climbing	no data
5. Nature Study	no data
6. Photography	no data
Extractive-Symbolic	
1. Fishing	41.17
2. Hunting	19.57
3. Collecting	no data

Source: Oregon Department of Transportation 1976a.

An unpublished 1971 study of Michigan State park campers by S. Ross Tocher shows how married and unmarried campers valued specific expected consequences. Both single and married campers highly valued the expected consequences of enjoying the natural surroundings and experiencing peace and tranquility. Timber management operations could inherently impact both types of campers.

Another study in 1971 (Bassett et al. 1972) quantified individual expected consequences of 593 trout anglers, 834 canoeists, and 255 cottage owners and riverside residents who were using Michigan's Au Sable River. Of the specific consequences listed, the following expected consequences were valued as extremely or very important by respondents (see Table 3-21). These expected consequences would be impacted by timber management operations in the JSYU. This analysis, of course, assumes that the expected consequences and desired experiences of Michigan recreationists are comparable to those of recreationists within the JSYU.

At this level of aggregation, the anglers and canoeists display similar values. For the sake of quantifying possible worst case

Table 3-21

Derivation of Worst Case Approximate Visitor-Day Reduction as a Result of Timber Management Operations Impacting Selected Expected Consequences of Fishermen

Expected Consequences	(a) Percentage of Respondents Checking Extremely or Very Important Response[1/]	(b) Total Annual Visitor-Days Within JSYU[2/]	(c) Worst Case Approximate Visitor-Day Reduction as a Result of Timber Management Operations Impacting This Desired Experience (a x b)
1. To enjoy the out-of-doors			
fishermen	80	12,100	9,680
residents-cottage owners	87	nd	nd
2. Restful environment			
fishermen	79	12,100	8,107
residents-cottage owners	73	nd	nd
4. Breath fresh air			
fishermen	65	12,100	7,865
resident-cottage owners	84	nd	nd
5. Escape city noise			
fishermen	62	12,100	7,502
resident-cottage owners	82	nd	nd

1/ Source: Bassett et al. 1972.
2/ Source: BLM Medford District Office.

visitor-day reduction only data on fishing within the JSYU is available. Further visitor-day reductions may occur as the desired experiences are adversely affected by timber management activities.

A number of studies focus rather clearly on the desired consequences expected from specific activities. Driver (1975) lists a number of studies examining the preferences of campers, canoeists, fishermen, hikers, hunters, snowmobilers, and participants in several activities. To the extent that timber management activities prevent the achievement of desired consequences and experiences, visitor-day reductions would result.

Fishing success and water sports could be adversely affected as a result of siltation, eutrophication, fish barrier construction, and changes in water quality which would result from some timber management practices and some road construction. Table 3-14 shows that the majority of timber management treatments will cause an increase in the amount of sediment yield. According to a study near Green Bay (Ditton and Goodale 1972), a larger proportion of swimmers indicate a willingness to substitute newly cleaned-up waterways (86.3 percent) than fisherman (79.7 percent) or boaters (63.4 percent). These findings were based upon a 1 percent change in water quality. This study indicates that recreationists participating in water contact sports and swimming would be more adversely affected than fishermen or boaters, respectively. Logging debris entering waterways will further increase this impact. This analysis, of course, assumes a similarity in values held by Wisconsin and Oregon recreationists.

As turbidity increases above 25 parts per million, fishing success declines (Phillips 1971). This would result in a loss of sport fishing activity. It has also been shown that a hypothetical 10 percent increase in salmon angling success would induce a long-run increase in fishing activity of 10 percent. Bottom fish angling activity is considerably less responsive to changes in success (Stevens 1966). Changes in fishing success and sports fishery recreational values would have negligible impact on the local economy. A discussion of the impact of timber management operations upon water quality and quantity can be found in the aquatics section. The impact of water quality degradation upon fish populations is examined in Section 3.2.4.

It was discussed earlier in this analysis how certain logging systems and road construction may create areas for dispersed recreation. It is also possible for some potential recreation sites (dispersed or developed) not yet identified or small tracts with primitive or roadless characteristics to be destroyed as a result of some timber harvests and subsequent activities. Each year, approximately 50 percent of the cutting, or 250 acres of clearcut and 2,500 acres of partial cut would be on new ground, previously undisturbed by man.

A discussion of the impacts of the proposed action to potential wilderness areas can be found in Section 3.4.5.

Many timber management practices create conditions hazardous to recreationists. The application of fertilizer and herbicides, tree falling, blasting, leaving cull

material, burning, and traffic associated with timber management operations would create dangerous situations for recreationists. Fertilizer would be applied on 22,300 acres. About 34,500 acres would be subjected to herbicide site preparation. Herbicides would be used for stand release on approximately 13,200 acres. Slash would be burned on about 10,100 acres. Some practices would eliminate hazardous conditions, however. Improved roads and the removal of dead trees would provide a safer environment for recreational pursuits. One hundred miles of existing road would be reconstructed. About 50 miles of existing road would be surfaced.

3.3.1.5 Conclusions

The impacts of timber management activities upon the recreation resource would be most significant to recreationists that desire, expect, and seek to experience a pristine environment. This category of recreationist participates in activities or enjoys knowing opportunities exist for the participation in activities directed toward appreciation and preservation of environmental features (i.e. seeing natural scenery, climbing, birding, nature study, photography).

The impacts of timber management operations would be meaningful to all recreationists as the quality of recreational experience is impaired. In many cases, timber management activities would result in additional areas for the pursuit of certain recreational activities (i.e., dispersed activities, hunting, berrypicking, photography). Some areas may be more accessible as a result of timber management operations and may benefit certain categories of recreationists (i.e., dispersed area of backcountry users).

3.3.2 Cultural Resources

Eight archeological sites have been identified within the boundaries of the Josephine SYU (Table 2-28). In Section 2.1.3.2, archeological sites have only been assigned township and range location to prevent vandalism as a result of this information being disclosed in this public document. Locations of historical sites are shown in Figure 2-18. While there are no specific sites of paleontologic interest, fossils have been known to occur throughout the unit. Complete surveys of the Josephine SYU to identify paleontologic and archeologic sites have not been undertaken. However, each proposed ground-disturbing activity would be preceded by a complete survey of cultural resources as part of the environmental assessment reports which precede each site-specific timber sale, and protection would be provided as necessary. The National Historic Preservation Act of 1966 and Executive Order 11593, as stated in the Code of Federal Regulations (36 CFR Part 800) would be fully complied with as appropriate.

The major types of local direct impacts associated with each timber harvest activity fall into three main categories:

1. Compaction of soil or sediment.

2. Physical disturbance of the ground surface.

3. Alteration of chemical properties of mineral soil by fire, chemical treatment, or addition of organic matter.

Compaction and physical disturbance usually occur during harvest. Chemical alteration usually occurs after harvest activities are complete, during slash disposal and site preparation.

Indirect impacts usually are seen after the harvest cycle is complete, and may occur both within and outside the immediate cut unit. A further discussion of these direct and indirect impacts can be found in Section 3.1.3.

All timber management practices which disrupt the ground surface would serve to locate and at the same time possibly destroy previously undisturbed pristine sites and objects. Both surface lithic sites and sites with structures or subsurface components would be damaged, though the extent of damage to a site with subsurface components would be less. Although data are not available to quantify impacts, ground-disturbance which causes extensive artifact displacement, loss, breakage, and churning could be expected. The potential area of soil disturbance and compaction as a result of cutting practices is summarized in Table 3-14. In addition to partial or total resource destruction, timber management activities would also alter the context of archeological resources and affect the preservation of data. Some activities such as landfilling or inundation could also significantly obstruct access. It is not possible to estimate the number of currently unidentified sites that would be lost as a result of timber management activities.

The quantification of impacts to unidentified archeological sites is not possible. Archeological sites would have to be examined on a site-by-site basis to determine how much impact would constitute an adverse effect. For example, on some sites, 0.7 percent severe surface disturbance would be intolerable; on others, perhaps 100 percent severe surface disturbance would not constitute an adverse effect, because the archeological values are confined to subsurface deposits (Wildesen 1977). The degree and extent of impacts are also variable, depending on the choice of felling, bucking, yarding, slash disposal, and development techniques. In most cases, duration of impacts would be permanent, because neither broken lithic materials nor their original surface distribution can be restored once altered.

Construction of roads could provide ready access to archeological and paleontological sites, resulting in increased traffic and the possibility of partial or total loss. Visitation to these unique sites would result in vandalism, looting, site damage, and site erosion. The esthetic, recreational, interpretive, and educational benefits of the sites would be lost.

Table 2-29 lists 41 identified historical sites within the JSYU. Three of these sites are currently on the National Register of Historic Sites. The Grave Creek Covered Bridge has been approved by the State Historic Preservation Office for nomination to the National Register in the near future. The bridge is included in a thematic group of 56 covered bridges throughout Oregon pending nomination to the Register. Sites on the National Register, nominated to the National Register, or eligible for nomination would be fully protected. No impacts to these sites are anticipated. It is likely

that other sites will be identified as having significant historical interest. It is possible that in the future other sites will be nominated for inclusion on the National Register. Prior to any ground-disturbing project, a thorough survey would be made to identify sites of significant historical interest. Protection of these sites would then become a priority. Approximately 2,500 acres would be subjected to Class III Intensive Field Inventories designed to identify and evaluate, from surface and exposed profile indications, all cultural resources within the site specific project areas.

A major impact of logging systems would be alteration of the landscape and vegetation near some historical sites. This disturbance of the sites' visual setting would reduce the esthetic, recreational, interpretive, and educational potential.

Some people might consider old-growth trees a type of "living history." According to the 1977 inventory of the Josephine SYU, 46 percent of the commercial forest in the unit is at least 200 years old. Cutting this old-growth timber could, in a sense, be construed as destruction of historical values.

Road construction and improvements would provide easier access to historical sites and open them to vandalism and partial or total destruction. The timber management proposal calls for the construction of 500 miles of permanent road that would take approximately 4,340 acres. About 100 miles of existing road would be reconstructed, and 50 miles of existing road would be surfaced.

Ground-disturbing activities which accompany timber management may have a severe impact on unidentified historical resources. Old wagon trails and other historical features could inadvertently be destroyed. Identified resources, however, would be protected in accordance with 36 CFR Part 800.

3.3.2.1 Conclusions

Timber management operations which disrupt the ground surface would result in some artifact displacement, loss, breakage, or churning at currently unidentified cultural sites. In some cases, the impacts to unidentified sites may be significant depending upon the amount of impact which would constitute an adverse effect on the site. Thorough surveys prior to ground-disturbing activities would make it highly unlikely that significant impacts would occur to currently unidentified sites.

In some cases, the alteration of a cultural site's visual setting may significantly reduce the esthetic, recreational, interpretive, and/or educational potential of the site. The cutting of old-growth trees would have a significant and adverse impact on those persons who appreciate the "living history" values of old-growth timber.

Vandalism and partial or total destruction of cultural resources as a result of site identification and accessibility may be significant in some cases.

No impacts are anticipated on those identified properties included on, nominated to, or eligible for nomination to the National Register of Historic Places.

3.3.3 Visual Resources

Most timber management practices change surface vegetation and create contrasts to the existing environment. Timber management and subsequent activities may produce beneficial or adverse short-term or long-term alterations of the landscape.

Virtually all timber management activities create evidence of human presence by disturbing previously undisturbed areas. It is estimated that approximately 50 percent of the cutting, or 250 acres of clearcut and 2,500 acres of partial cut would be on new ground, previously undisturbed by humans. These areas would be especially prone to the creation of contrasts.

Some timber management activities bring about changes in atmospheric conditions which may be visually or esthetically objectionable. Fumes and dust from slash-burning not only impair visibility but create conditions hazardous to humans. Section 2.1.1.2 dealing with impacts of the proposed action upon air quality further examines the effects of timber management operations upon visibility (Table 3-2).

As the number of recreationists and viewers increase, the visual impacts of a management activity increase also. A demand increase of 103 percent for pleasure driving and sightseeing is anticipated between 1970 and 1990 (Oregon Department of Transportation 1972). The extent of impacts upon visual resources can therefore be projected to increase in direct relation to increased future pleasure driving and sightseeing demands. Additionally, should attitudes or tastes change and viewers decide to prolong the duration of their viewing, the visual impacts of a management activity also increase.

3.3.3.1 Silvicultural Practices

Within the JSYU, there is little natural variation or enforced pattern into which visual impacts can be absorbed. Simple and uniform textured vegetation is highly vulnerable to impacts of disruption. For this reason, clearcutting would create strongly contrasting geometric forms and vegetative texture groupings. Approximately 5,000 acres would be clearcut. The juxtaposition of clearcut units and forested landscape would produce long-term impacts upon the visual resource. As a beneficial impact for recreationists, clearcuts would provide areas suitable for viewing wildlife.

The falling of merchantable timber through a two-stage shelterwood cutting system would also result in long-term alterations of landscape character. The first stage of a shelterwood cut would not impact the visual resource as drastically as clearcutting would. Upon completion of the second stage of the two-stage cut after a 5 year time lag, impacts upon the visual resource will be comparable to those resulting from clearcutting. Approximately 50,000 acres would be harvested through a two-stage shelterwood system.

Thinning operations would tend to produce short-term impacts upon the visual resource. Precommercial thinning would be done on about 14,200 acres. About 4,700 acres would be subjected to commercial thinning. In many cases, such timber management practices as thinning could be effectively used to enhance

the environment by changing form, line, texture, color, and vegetative groupings. These long-term enhancements may result in incidental short-term adverse impacts.

At the Petawawa Forest Experiment Station in Canada, a numerical index has recently been developed to quantify the esthetic impact of forest management practices such as logging (Methven 1974). This index could be most helpful in quantifying the impacts of silvicultural and other forest management practices in specific landscapes. The index is based on six esthetic variables -- species diversity, structural complexity, forest view, slash visibility, pattern, and boundary form. The methods used to measure these esthetic variables are based upon a number of guidelines and assumptions, relevant to this discussion of the esthetic effect of forest management alternatives in quantitative terms. Those assumptions and guidelines include the following (Methven 1974):

1) That species diversity measures both the variety or richness of the vegetation plus the relative abundances of the constituent species.

2) That structural complexity is composed of two components; vertical stratification and age structure.

3) That forest view is essentially a measure of visual penetrability and that its value is a function of the density of the vegetation. The basic assumption is that esthetic value is proportional to the depth of view.

4) That the most obvious and generally negative consequence of most harvesting methods are unsightly accumulations of logging slash over the treated area.

5) That only slash which is easily visible or constitutes an obstruction to free movement is considered esthetically objectionable since material lying on the ground or close to it is shielded from view by minor vegetation easy to step over and subject to rapid decomposition.

6) That pattern is a two-alternative (i.e., uniformity vs. nonuniformity) variable composed of two components: uniformity of pattern and regularity of spacing.

7) That straight boundaries and roads are considered esthetically negative while naturalistic boundaries which follow original stand boundaries of physiographic features are considered positive.

Such an index could be used to compare the impacts of different timber management practices in site-specific areas. That level of analysis would be carried out in the site-specific EARs.

3.3.3.2 Yarding/Loading

Vehicle operation associated with yarding and loading would produce short-term alterations of landscape character. Vehicle operation could result in long-term landscape alterations and inherent adverse impact upon the visual resource. These impacts would be mainly disturbance of soil and surface vegetation. About 23 percent of the proposed allowable cut would be tractor yarded. Soils within the upland timber characteristic landscape

are highly reflective of light when disturbed and are especially prone to adverse impact.

There is considerable variation in the degree and extent of soil and vegetative disturbance for different yarding systems. When percentage of severe disturbance is plotted by yarding system type, it becomes apparent that ground support systems tend to result in greater areas of severe disturbance of sediments per total area logged than do aerial support systems (including skyline). This topic is further examined and quantified in the discussion of impacts upon soil and vegetation.

3.3.3.3 Road Construction

Blasting, excavation, and road construction would result in long-term landscape alterations. The construction of 500 miles of road will affect 4,340 acres. Due to soil colors in many areas of the Josephine SYU, road construction would create strong contrasts. Road construction and maintenance could benefit the visual resource by providing scenic access and panoramic views, and by focusing attention on specific scenic features. Therefore, impacts could be both adverse and beneficial.

3.3.3.4 Development and Protection Practices

Burning, fertilization, and herbicide application would produce both short-term and long-term alterations of the landscape. Development and protection practices primarily result in long-term enhancement and short-term adverse impacts upon the visual resource. Scarification would result in short-term disturbances of surface vegetation and soil. Mechanical scarification would affect 160 acres. Fertilizers could be used to rehabilitate areas denuded by fire, flood, avalanche, or disease. The short-term impacts of fertilization are related to vegetative reestablishment, growth, and protection. These impacts benefit the visual resource by decreasing vegetative contrast. The effects of a single application of fertilizer on annual growth can usually be continuously recorded over a 10-year period. About 22,300 acres would be fertilized. The application of herbicides would control herbaceous or woody vegetation prior to or following seeding or planting. The dead vegetation resulting from chemical weed and brush control creates highly visible effects. Herbicide site preparation would affect about 34,500 acres. Stand release by use of herbicides would affect 13,200 acres. Slash disposal would be apparent on about 43,600 acres.

The degree to which a management activity adversely impacts the visual quality of the landscape depends upon the amount of visual contrast that is created between the activity and the existing landscape character. The amount of contrast between a proposed activity and the existing landscape character can be measured by separating the landscape into its major features (land and water surface, vegetation, and structures), and then predicting the magnitude of change in contrast of each of the basic elements (form, line, color, and texture) for each of the features. Studies evaluating the esthetic dimension of harvested areas in Wyoming and Montana agree with intuition that as the amount of downed wood or the evidence of man's activity increases, forest scenes are less liked by observers (Schweitzer et al. 1976).

Certain areas of the landscape are more sensitive to impacts than others. Where dissimilar materials meet (sky meeting forest or conifers meeting hardwoods, for example), the landscape is particularly vulnerable to disruption. Impacts at higher locations are usually more apparent than those lower in the landscape. The higher the location, the more extensive both the area and the distance from which it can be seen. On steepening slopes, a typical impact such as road construction would occupy increasing amounts of transverse area. On steep slopes visual vulnerability is greater (Litton 1974).

Contrast rating is applied to all proposed land management activities which disturb the soil, change or remove vegetation, or place a structure in the landscape. It is applied to all areas needing rehabilitation or enchancement. The EARs deal with the application of the contrast rating system to specific timber sales.

Assessing the amount of contrast for a proposed activity can give a good indication of the severity of impact and serve as a guide in determining what is required to reduce the contrast to the point where it will meet the criteria for the visual resource management classes of the area (BLM Manual, Visual Resource Management, 6300). Visual resource management (VRM) classes for the Josephine SYU are specified and discussed in Appendix G. Approximate acreages of high intensity management lands within each VRM class is as follows:

VRM Class	Approximate High Intensity Acreage	Approximate Percent of High Intensity Land
I	9,009	4
II	3,424	2
III	30,125	14
IV	179,500	80
Total	222,058	100

The impacts of timber management activities upon VRM Class I lands would be nonexistent as timber harvest is not allowed on such lands. The impacts of timber management activities upon VRM Class II, III, or IV land could be insignificant, moderate, or severe, depending upon amount of contrast created. Where the impact is either moderate or severe, the contrast rating scores would be used to determine the most effective means of mitigating the impact, with the idea in mind of making the proposed project meet the VRM class requirements of the area.

Only about 2 percent of the high intensity lands are classified as VRM Class II. Since the protective shelterwood method would be used on these lands, impacts within this class would be virtually nonexistent. There would be no harvesting of Class II lands within the visual foreground

of the Rogue Wild and Scenic River. There is a slightly greater chance of adverse impacts occurring in VRM Class III where 14 percent of the high intensity land is located. Should adverse impacts occur, the majority of them would be within VRM Class IV lands as 81 percent of the high intensity land has been designated as VRM Class IV.

3.3.3.5 Conclusions

Timber management operations create visual contrast. The most significant contrasts are long-term alterations of the environment. Silvicultural practices, vehicle operation associated with yarding and loading, and blasting, excavation, and road construction would create significant impacts. Short-term visual resource alterations also create contrasts. Slash burning and traffic, thinning operations, vehicle operation associated with yarding and loading, and development/protection practices would create significant impacts in the short term.

The BLM's contrast rating system would be applied to each specific timber sale to assess the severity of impact of the proposed activity. The most effective means of mitigating the impact would be determined, and the BLM would attempt to make the proposed project meet the VRM class requirements of the area.

Impacts upon VRM Class I lands would be non-existent as timber harvest is not allowed on such lands. Impacts to VRM Class II lands would be virtually non-existent as only about 2 percent of the high intensity timber management lands are classified as VRM Class II and would be harvested under the protective shelterwood method. Impacts would be most significant upon VRM Class III and Class IV lands where 14 percent and 81 percent, respectively, of the high intensity land is located.

3.3.4 Noise

Virtually all timber management activities create noise. Studies have shown that recreationists differ in their desire for solitude and seclusion (Hendee et al. 1968; Stankey 1973). Wilderness purists prefer serenity and solitude more strongly than do visitors to more accessible locations. In relatively inaccessible areas of the Josephine SYU, any noise suggesting human activity would have a negative, annoying, or intrusive connotation. In this case, physical properties do not account for the annoyance. Rather, it is the fact that the noise merely signifies the presence of unwanted and unexpected people.

A study by Harrison (1974) identified 11 sources of sound which intrude upon the wilderness experience. According to the opinion of some forest officers, seven were considered less intrusive (USDA Forest Service 1969):

1. Sawing with a two-man saw.
2. Chopping with an axe.
3. Using a pick or shovel or both.
4. Rock drill and sledge.
5. Firearms (.22 caliber pistol and 30.06 rifle).
6. Man shouting as loudly as possible.

7. Two trail crews working with hand tools.

The four most intrusive sounds were identified as:

1. Dodge pickup truck, 1966 V8.

2. Motorcycle, 350-cc "Velocette."

3. Small, high-speed, 2-stroke engine, McCulloch portable welder.

4. Chainsaw, Wright model 30.

The more intrusive a sound is, the greater its degree of impact upon forest visitors.

When the desire and expectation for solitude is not so great, noise intrusiveness and impact may be more dependent on physical properties, intensity, frequency, and intermittent recurrence (Dailey and Redman 1975). Impacts can also be decreased by visually screening the noise source. Impacts would increase if noise sources were visible, even if beyond earshot.

Timber management activities would have substantial auditory impacts. While only temporary noise sources, motorized vehicles and equipment would greatly impact the quality of the forest experience. Harrison (1974) has found that in a forest a motorcycle becomes just audible at distances ranging from 1,400 feet to 3,900 feet from the receiver, depending on vehicle size. In the average situation, a chainsaw can be heard to a distance of 1.43 miles with a standard deviation of half a mile. By extrapolating levels measured at shorter distances, it was found that chainsaw noise is just inaudible when it is 15dB below the ambient noise level (dBA). Similarly, skidder noise could be heard to a distance 1.45 miles $\pm$ .75 miles. At these distances skidder noise is below the ambient noise by 10dB with A-weighting (see Figures 3-6 and 3-7). Assuming that noise levels have a normal distribution, both chainsaws and skidders should be inaudible 50 percent of the time at 1.5 miles. Chainsaws should be inaudible 85 percent of the time at 2 miles, skidders inaudible 85 percent of the time at 2 miles, skidders inaudible 85 percent of the time at 2.2 miles. Natural masking noises would have to be at a very low level for these machines to be heard at 2.0 and 2.2 miles, respectively (Myles et al. 1971).

To eliminate acoustic annoyances by completely muffling or submerging them in background noise, the sound pressure level caused by forestry equipment must be reduced to about 15dB below the prevailing background noise. An example with a sound level of 100dB at 50 feet is a poorly muffled chainsaw. Under normal forest conditions, the saw would have to be more than 1 mile from the receiver to be completely inaudible. Certain topography or atmospheric conditions could easily quadruple this distance (Harrison 1974).

Within areas of the Josephine SYU, differing background noise levels and attenuating factors would result in varying degrees of impacts and require different spacing requirements to control noise intrusiveness. Furthermore, the impacts and control of intrusive noise from timber management would depend upon the desired quality of forest experience to be maintained. Dailey and Redman (1975) examined and quantified noise for three different forest situations (pristine, primitive, and

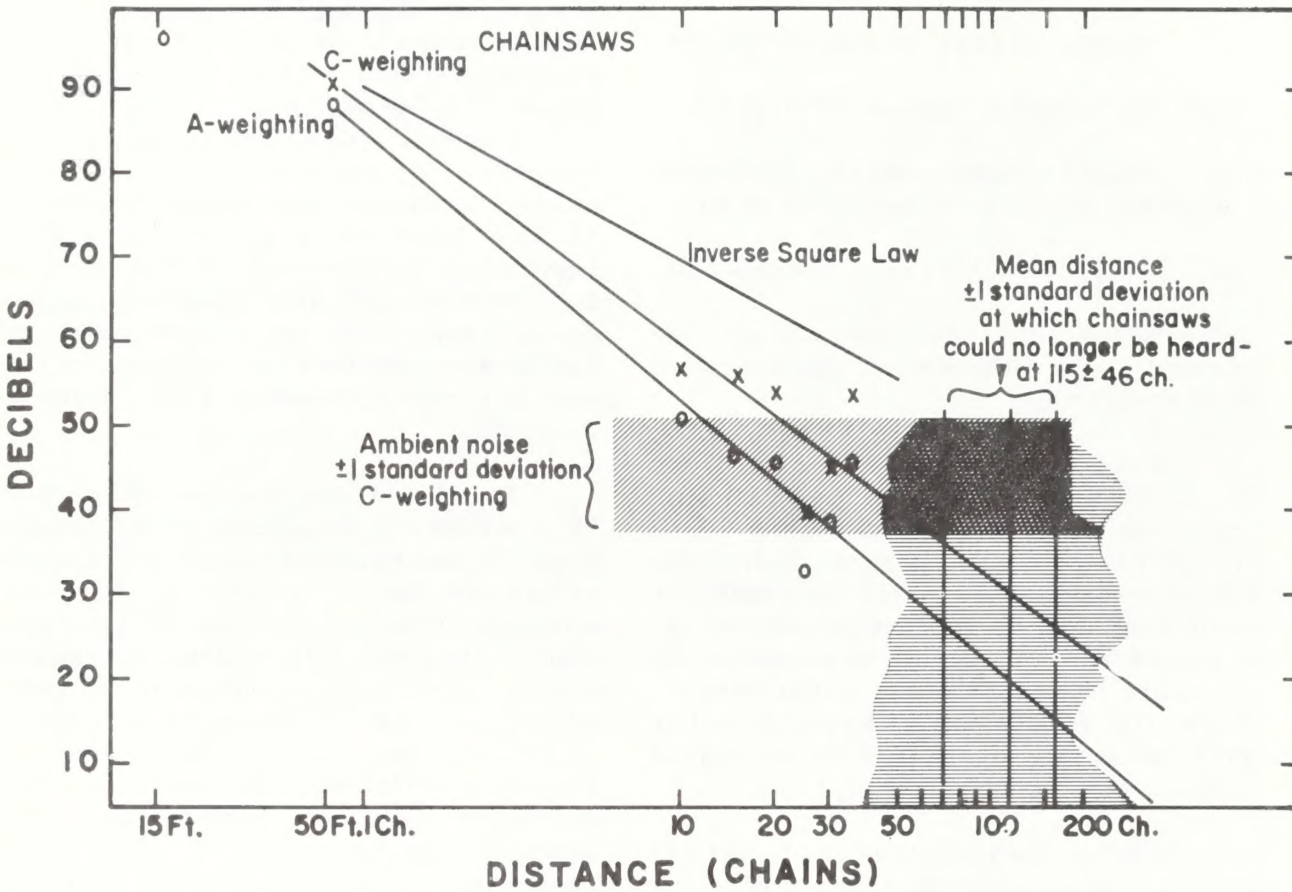


Figure 3-6 **DISTANCES FROM NOISE SOURCES OF INAUDIBILITY FOR CHAINSAWS VERSUS AMBIENT NOISE LEVEL**

SOURCE: Myles et al. 1971

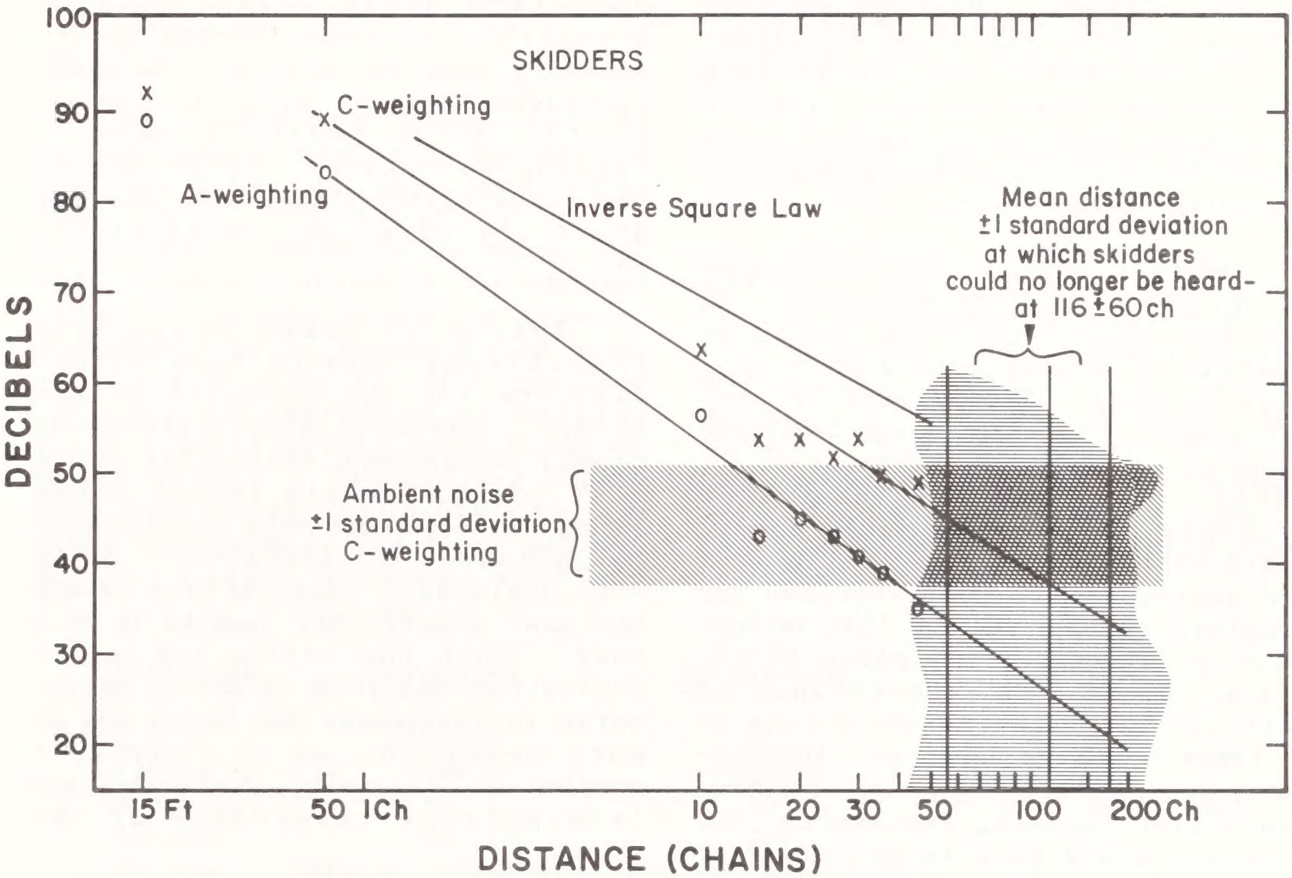


Figure 3-7 DISTANCES FROM NOISE SOURCES OF INAUDIBILITY FOR SKIDDERS VERSUS AMBIENT NOISE LEVEL
SOURCE: Myles et al. 1971

portal), each dependent upon visitors' expectations of solitude and isolation. Forest users are most affected by a sound's connotation, rather than its level or duration (Parry and Stephens 1969). Perhaps greater tolerance criteria could be established for noises that do not hold unpleasant connotations. Impacts resulting from this type of noise would be less than for noise with unpleasant connotations.

Another noise criterion has been established for wilderness areas. It has been found that the rumble of traffic on a busy road a mile or 2 away is 45dB. This figure is also the commonly accepted noise level for suburban sleeping areas (Myles et al. 1971). Harrison concludes that probably the most sensible course would be to select something between the approximately 20dB required for complete silence and the 45dB delineated as a maximum (Harrison 1974). Again, visitor's expectations of solitude and serenity would have to be taken into consideration. Furthermore, the proximity of noise-sensitive properties (motels, residences, for example) would have to be considered when determining degree of impacts and methods for control of noise intrusiveness.

Noise level data specific to timber management activities on the Josephine SYU is not available. In the Canadian Forestry Service study, the average effects of topography, forest cover and weather were incorporated in the results. These average effects are representative for those parts of eastern Ontario and western Quebec where the measurements were made, but they may not be applicable under different conditions. While environmental conditions may be different, machines used are essentially the same. In any case, the study provides a firm technical basis to justify a criterion level increased by at least 5dB to establish a point at which mechanized logging operation noise would still be acceptable to other forest users. Assuming such an increase, the study concludes that, in order to produce little or no auditory impact, logging operations should not be permitted closer than a mile from the arbitrary location (Myles et al. 1971).

Intrusive sound would have significant impacts upon forest visitors for the duration of the noise. Intrusive noise created by timber management activities would most significantly impact those forest visitors with high expectations for solitude or isolation. Noise with unpleasant connotations create the most significant impacts in this case. When the desire and expectation for solitude is not so great, noise intrusiveness and impact may be more dependent on the physical properties, intensity, frequency, and intermittent recurrence of the noise.

3.3.5 Human Health

3.3.5.1 Health

Impacts of proposed herbicide use on human health as described in this section are derived primarily from the U.S. Forest Service Environmental Statement describing herbicide use for Region 6. This material has been supplemented by recent information that has become available in regard to the TCDD contaminant of silvex and 2,4,5-T.

The possibility of human health being impacted by the proposed use of

herbicides on 47,700 acres is related to the proximity of project areas to human populations, the probability of applicators being exposed and the toxicity of the chemicals proposed for use.

Toxicity

The chance that humans exposed to herbicides used in timber management would be adversely impacted is related to the toxicity of the herbicides. Research has shown that the chemicals proposed for use are relatively non-toxic to humans. Therefore, it is expected that human exposure as a result of herbicides applied as described in Section 1.6.4.1 would result in no injury to human beings. The minimal hazard that does exist diminishes with time after treatment. The final judgment on the risks involved with all pesticides rests with EPA in the registration and RPAR processes.

Selected information on the relative toxicity of herbicides and other chemicals in everyday use was compiled by Heikes (1967). This information is displayed in Table 3-22.

Carcinogenic and Mutagenic Potential of Herbicides

Laboratory tests on various animals such as mice and rats can be conducted to evaluate the teratogenic, carcinogenic and mutagenic potential of 2,4-D, silvex, atrazine, dalapon, and tordon. The tests involve feeding these animals low levels over extended periods of time. The following results have been indicated from available publications:

Herbicide	Teratogen	Carcinogen	Mutagen
2,4-D	Unknown	No	No
Silvex	Yes	Unknown	No
Atrazine	No	No	Data not available
Tordon	No	Yes	" " "
Dalapon	Data not available	Data not available	" " "
Roundup	" " "	" " "	" " "

Silvex

Silvex (2,4,5TP) contains the contaminant TCDD that has been most commonly found in 2,4,5-T. Research has tended to concentrate on 2,4,5-T - TCDD effects. In order to fully explore the potential human health effects of TCDD, the following information is discussed regardless of whether it addresses TCDD in 2,4,5-T or silvex. Most of the information is taken directly from the U.S. Forest Service, Environmental Statement on Vegetation Management with Herbicides (Region 6, 1978).

Rebuttable Presumption Against Registration (2,4,5-T)

Because of uncertainties about human health effects, 2,4,5-trichlorophenoxy acetic acid (2,4,5-T) has been placed in RPAR status by EPA. (RPAR refers to Rebuttable Presumption Against Registration, a formal

Table 3-22

Relative Toxicity of Herbicides to Humans

Common Name or Designation	Some Common Trade Names	LD_{50} 1/ mg/kg	Toxicity Rating
2,4,5-T (2,4,5-TP)	Various (Silvex)	300	3
2,4-D	Various	500	4
Aspirin*		750	4
Dicamba	Banvel-D	1,040	4
Atrazine	Atrazine	3,080	4
Table Salt 2/		3,320	4
Picloram	Tordon	8,200	5

Toxicity Rating	Class	LD_{50} mg/kg	Probable Lethal Dose for 150 lb. man
1	Extremely toxic	Less than 5	A taste (less than 7 drops)
2	Very toxic	5-49	7 drops - 1 teaspoonful
3	Moderately toxic	50-499	1 teaspoonful - 1 ounce
4	Slightly toxic	500-4,000	1 ounce - 1 pint (1 lb.)
5	Nontoxic	5,000-14,999	1 pint - 1 quart
6	Nontoxic	15,000 & above	More than 1 quart

1/ LD_{50} is the rate at which test animals were fed in relation to body weight (mg/kg) and half or 50 percent of the test animals died (Lethal dose, 50 percent).

2/ Included for a comparison with chemicals in everyday use.

Note: For the purpose of comparison, the data given in this table for 2,4,5-T can be considered equivalent to the herbicide Silvex (2,4,5-TP) proposed for use by the Bureau.

Source: Heikes 1967.

risk-benefit review within EPA's Registration Division). In addition, silvex and 2,4,-D are in pre-RPAR review. (See letter No. 13 in Appendix M.)

The current RPAR proceedings on 2,4,5-T are directly related to silvex because this chemical also contains TCDD (dioxin). The environmental impacts of TCDD as currently known to EPA are described in detail in the Federal Register, Vol. 43, Friday, April 21, 1978. A copy is on file for review at the Bureau's Portland, Oregon, office.

The Code of Federal Regulations requires that "a rebuttable presumption shall arise if a pesticide's ingredients ... (i) induces oncogenic (tumor causing) effects in experimental mammalian species or man as a result of oral, inhalation or dermal exposure." The Code also provides that "a rebuttable presumption shall arise if a pesticide's ingredients ... (p) produce any chronic or delayed toxic effect in test animals at any dosage up to a level as determined by the administrator which is substantially higher than that to which humans can reasonably be anticipated to be exposed taking in margins of safety."

Studies indicate that 2,4,5-T containing less than .05 ppm TCDD and/or TCDD alone have caused oncogenic effects in two mouse strains and one rat strain (43 FR 78: 17124, 1978). Studies have also shown that 2,4,5-T containing 0.5 ppm or less TCDD produces teratogenic (deformaties) and/or fetotoxic effects in mice at 30 mg/kg, in rats at 100 mg/kg, in hamsters at 40 mg/kg, and in birds at 1 mg/kg (Ibid., p. 17128).

The EPA working group on pesticides has concluded that an ample margin of safety does not exist for the population at risk (women of child-bearing age) for dermal and inhalation exposure and for cumulation oral, dermal, and inhalation exposure to both 2,4,5-T and TCDD (Ibid.).

Bioaccumulation

Bioaccumulation means the uptake and at least temporary storage of a chemical by an organism. TCDD is present in such minute quantities in the environment that toxicity from primary exposure (i.e., exposure resulting from indirect ingestion of vegetation or water, dermal absorption or inhalation) is unlikely (Norris et al. 1977a). Bioaccumulation may be a mechanism by which organisms collect or concentrate TCDD from primary exposure. These organisms would then carry possibly toxicologically significant residues as food sources for other creatures. For instance, the amount of TCDD required to produce harmful effects in humans is spread out over such an area that direct personal exposure to that amount is unlikely. But if deer bioaccumulate TCDD as they feed, human consumption of these deer could conceivably lead to significant human exposure. The question is then, does bioaccumulation occur, and if so, to what degree?

Physical-chemical properties are good indicators of the potential for bioaccumulation. Chemicals with low water solubility and high fat solubility have a strong potential for bioaccumulation. DDT is an example of a chemical which is low in water solubility (0.001 ppm) and high in fat solubility (86,000 ppm in corn oil). DDT is known to bioaccumulate in exposed organisms. TCDD is low in

water solubility (0.0002 ppm) but is also low in fat solubility (47 ppm in corn oil). The ratio of oil solubility to water solubility is 86 x 10^6 for DDT and 0.2 x 10^6 for TCDD. These physical-chemical properties suggest that TCDD would bioaccumulate in exposed organisms but probably to a lesser degree than DDT. The degree of bioaccumulation depends on the magnitude and duration of organisms exposure.

Bioaccumulation can also be studied in laboratory animals or in small laboratory ecosystems. Several such studies have been done. Data from laboratory feeding studies of mammals and fish; and from laboratory-scale aquatic ecosystems are described below.

In laboratory feeding studies with repeated exposure, Fries and Marrow (1975) report that after 6 weeks of exposure, rats reached a steady-state which was 10.5 times the daily intake. Rose et al. (1976) also report steady-state concentration in rats in 7 weeks at little more than ten times the daily intake level. These data establish that in laboratory feeding studies, animals which ingest TCDD in their diet will accumulate TCDD in certain body tissues, at least for as long as exposure continues. It is also clear, however, that TCDD is not irreversibly accumulated in these feeding studies. Piper et al. (1973), Allen et al. (1975), Rose et al. (1976), and Fries and Marrow (1975) all found a halftime for TCDD residence in the body which ranged from approximately 12 to 30 days. These data indicate that once exposure to TCDD stops, the body burden will decrease. In a feeding study with rainbow trout, Hawkes and Norris (1977) report limited and preliminary data indicating that on a whole body basis, TCDD levels in fish are approximately of the same order of magnitude as the level of TCDD in the food they consume.

Matsumura and Benezet (1973) exposed several organisms in model aquatic ecosystems to TCDD. Unfortunately, in most of their studies, the concentration of TCDD in the water was substantially in excess of the limits of its solubility, preventing meaningful interpretation of the data. In one experiment, however, TCDD was adsorbed on sand in the bottom of the aquaria and Matsamura and Benezet found 0.1 ppb TCDD in water and 157 ppb in brine shrimp, to give a concentration factor of 1,570.

Isensee and Jones (1975) also used a laboratory-scale aquatic ecosystem to study TCDD bioaccumulation in mosquito fish, fingerling, channel catfish, algae, duckweed, snails, and water fleas. TCDD was adsorbed on soil which, when equilibrated with the water, resulted in TCDD concentrations in water ranging from 1,330 to 0.05 ppt. Concentrations in excess of 200 ppt exceed the limits of water solubility for TCDD and prevent meaningful interpretation of those bioaccumulation data. In experiments where the water concentration was less than 200 ppt, bioaccumulation ratios (i.e., the ratio of the concentration of TCDD in the organism to the concentration of TCDD in the water) ranged from 2 x 10^3 to 63 x 10^3. They found a strong, positive correlation between the concentration of TCDD in tissue and concentration of TCDD in water for all organisms. Isensee (1977) recalculated this data from a dry weight basis to a fresh weight basis in order to make the data more

comparable to other studies. He reports the average degree of bioaccumulation ranged from 2 to 7 x 10^3 times the water concentration of TCDD. The total amount of TCDD accumulated was directly related to the water concentration. Equilibrium concentrations in tissues were reached in 7 to 15 days. He reports TCDD bioaccumulates to about the same magnitude as many of the chlorinated hydrocarbon insecticides in model aquatic ecosystem.

These results from laboratory studies indicate that organisms exposed to TCDD in their diet or in aquatic ecosystems will bioaccumulate TCDD.

The degree of bioaccumulation which occurs from the use of TCDD-contaminated herbicides in forest ecosystems depends on the magnitude and duration of organism exposure. In laboratory studies, organism exposure is assured through regular addition of TCDD to the food for feeding studies or, in aquatic ecosystems, through the placement of a substantial reservoir of TCDD adsorbed on sand or soil resulting in continuous release of small quantities of TCDD to water. In the natural environment (in contrast to laboratory studies), several processes operate to reduce or eliminate TCDD exposure to organisms and thereby minimize the opportunities to bioaccumulation. Crosby and Wong (1977) report TCDD in herbicide formulations disappears rapidly from vegetation and soil when exposed to sunlight. This mechanism would markedly reduce or eliminate organism exposure through dermal contact with or ingestion of contaminated vegetation. In the aquatic environment, the likelihood of 2,4,5-T and TCDD entry into aquatic systems is slight, but if it does occur, chemicals in the water are rapidly diluted and carried downstream with streamflow. TCDD which adsorbs on sediments provides a reservoir of TCDD in the aquatic environment similar to that provided in the model aquatic ecosystem studies. However, in the real stream system, TCDD liberated from the sediment is quickly moved downstream with streamflow, minimizing the opportunity for bioaccumulation by a particular organism.

The third approach to evaluating TCDD bioaccumulation is to look directly for evidence of bioaccumulation in the field. Several efforts in this regard have been made, but with different sophistication and sensitivity of analytical methods. For instance, Woolson et al. (1973) analyzed samples of eagle tissues from various regions in the United States. No TCDD was detected. The minimum detection limit, however, was 50 ppb, which is not an adequate level of sensitivity to properly evaluate bioaccumulation of TCDD, considering the inherent toxicity of the molecule.

Young et al. (1976) studied the behavior and bioaccumulation of TCDD in animals from the Elgin Air Force Base site used for equipment development and testing for application of herbicides in Vietnam. The study area received massive applications (1,000 pounds per acre) of 2,4,5-T, much of which contained TCDD in excess of 1 ppm. Analysis of soil from the test site shows TCDD residue levels in the range of 10 to 1,500 ppt. Analysis of rodents, reptiles, birds, fish, and insects shows the presence of TCDD in tissues of at least some of the organisms involved in this test program. The results of this test substantiate the theoretical

data and the data from laboratory tests which indicate that, if TCDD is available to organisms in the field, it will be bioaccumulated. The degree to which herbicide used at the Elgin test site was contaminated with TCDD and the massive rates of application, however, make these data not directly applicable to the use of the herbicides in forestry. It is useful to indicate TCDD does have a potential for bioaccumulation.

Other studies done in connection with registered uses of 2,4,5-T for vegetation control have found relatively little TCDD in biological samples.

In 1973-74, the Environmental Protection Agency, cooperatively with the Forest Service, conducted a monitoring program for TCDD in tissues of animals from several areas in western Oregon and Washington which had been recently treated with 2,4,5-T. The methodology employed at that time was not adequate to establish the presence of TCDD in these environmental samples, but was adequate to determine which samples did not contain TCDD in the low to middle part per trillion range. Results of the monitoring program show approximately 85 percent of the samples did not contain detectable levels of TCDD. The remaining samples which are described by EPA as "minutely suggestive" for TCDD have been subjected to confirmatory analysis. Results are contained in Appendix G of the USFS Region 6 Final Environmental Statement, Vegetation Management with Herbicides, 1978.

The EPA beef fat monitoring program, which was initiated in 1974, has been completed. Samples of beef fat (85) and liver (43) from animals grazing in areas treated with 2,4,5-T have been analyzed for TCDD. Approximately 25 percent of these samples are from animals not exposed to areas sprayed with 2,4,5-T. EPA reports (EPA Draft Dioxin Position Document, Appendix D) one sample shows a positive TCDD level at 60 ppt, two samples appear to have TCDD at 20 ppt, and five may have TCDD in the range of 5 to 10 ppt. EPA states, "The analytical method is not valid below 10 ppt." Of the 43 liver samples analyzed, one sample was below detection limits for quantification. A fat sample from the same animal showed no TCDD residue. The results of the EPA beef fat monitoring study indicate bioaccumulation of TCDD in grazing animals is not sufficient to result in regularly detectable levels of TCDD greater than 10 ppt in beef fat and liver.

Newton (1975) reported on the analysis of livers from mountain beavers captured 2 months after a forested area in western Oregon had been treated with 2,4-D and 2,4,5-T. Analysis of the tissues showed no detectable levels of TCDD with a minimum detection limit of less than 10 ppt. Mountain beavers normally consume large quantities of vegetation, thereby affording them substantial exposure to herbicide-treated plants. In addition, they are a burrowing animal which puts them in contact with herbicides and TCDD present on the soil surface.

Shadoff et al. (1977) conducted a broad study to determine whether TCDD was accumulating in animals due to the use of 2,4,5-T in the midwestern United States. They did not detect any TCDD (detection limit which averaged less than 10 ppt) in samples of fish, water, mud, and human milk from areas in Arkansas and Texas.

Meselson (1977), in a tentative and preliminary report to Congressman Weaver, indicated some samples of human milk from areas in which 2,4,5-T is used contained detectable levels of TCDD. Meselson reported three samples out of six from Texas, and one sample out of five from Oregon contained detectable levels of TCDD, but the levels of detection were substantially below the 10 ppt level established by EPA in the beef fat monitoring program as the minimum acceptable, reportable level.

The results of these various tests indicate that if TCDD is present in the environment in a form which is available to organisms, then bioaccumulation would occur if organisms are exposed. This concept is supported both from an examination of the physical-chemical properties of TCDD, as well as by studies of its behavior in animals exposed through feeding studies or in laboratory model aquatic ecosystems. The degree to which bioaccumulation of TCDD occurs in the field is dependent not only on the physical-chemical properties of the compound, but also on the persistence and availability of TCDD in the environment. Mechanisms of degradation and dilution which operate in the natural environment reduce the opportunities for organisms to be exposed, and thereby reduce the degree to which bioaccumulation might occur.

Monitoring for TCDD residues in animal samples from areas where 2,4,5-T is used at normal rates of application tends to show little or no detectable bioaccumulation of TCDD. In the beef fat monitoring study, for instance, only three samples out of 63 contained TCDD at levels within the range at which the analytical method is valid quantitatively. The EPA monitoring for TCDD, in animal samples from western forests conducted prior to June 1974, shows at least 85 percent of the samples do not contain detectable levels of TCDD (the other 15 percent require confirmatory analysis). The study of TCDD residue in livers of mountain beavers from areas treated with 2,4,5-T shows no detectable levels of TCDD, with minimum detection limit of less than 10 ppt. A widescale monitoring of water, sediment, fish, beef, and human milk from areas in the midwestern United States where 2,4,5-T has been used operationally also shows no detectable TCDD residues at minimum detection levels which average 10 ppt. These monitoring efforts indicate that substantial bioaccumulation (sufficient to produce residue levels in excess of 10 ppt TCDD in the majority of the population) is not occurring in animals in or near areas treated with 2,4,5-T in current operational programs.

Cumulative Effects of TCDD

Some toxicologists interpret recent experiments with primates (Allen et al. 1977) as indicating that the effects of sublethal doses of TCDD may be cumulative and death results if a sufficient number of sublethal doses are received. Stated another way, these experiments may suggest that the lethal amount of TCDD in primates is approximately the same regardless of whether the dose is received all at once or in numerous small doses. If this is true, it means any estimate of an acceptable exposure level must assume additive effects over long periods (USFS 1978, p. 108).

A primate study by Allen (1977) used TCDD in the diet at 500 ppt. This is a level substantially greater

than likely to be available to organisms in the forest, even immediately after application of 2,4,5-T. Norris et al. (1977) estimates initial TCDD residue levels on vegetation of 5 to 10 ppt immediately after application. Crosby and Wong (1977) report TCDD halflife on vegetation of only a few hours when exposed to sunlight. Therefore, the probability of chronic exposure to levels of 500 ppt TCDD is remote. If the response of primates in Allen's study is proportional to the dose received, exposure to 5 ppt would permit survival for 100 times as long as reported by Allen. This would be well beyond the normal life span of primates (USFS 1978, p. 108).

Additional experimentation with primates is necessary to clarify the Allen finding. Chronic exposure at levels relevant to possible environmental residue levels is needed. Periodic exposure to higher levels (10 to 500 ppt), with periods of no exposure between, also need to be tested. The exposure level used by Allen may have overloaded or inactivated the detoxication and repair processes of organisms usually employed in responding to chronic toxic exposure. The exposure regimes described above would test this hypothesis (USFS 1978, p. 108).

Cumulative effects of TCDD have not been seen in other species. In guinea pigs, dose rates of 0.2 μg/kg weekly for eight weeks provided a total dose almost three times the LD_{50}, but no deaths occurred, and organ changes, while measurable, were not severe (Vos et al. 1973). Vos et al. (1974) also reported that rats accepted about three times the LD_{50} of 20 μg/kg over a 13-week period without lethality (USFS 1978, p. 108).

Experiments conducted thus far are not adequate to determine with any certainty that TCDD does or does not have cumulative effects in animals. The evidence to indicate possible cumulative effects comes from a single study with primates. Evidence opposing the cumulative effect theory comes from studies with guinea pigs and rats. The possibility of cumulative effect is important, and carefully designed experimentation is needed to clarify the point. However, there is insufficient evidence at this time for the Forest Service to determine that use of 2,4,5-T, as registered by EPA, would result in cumulative toxic effects from TCDD in people, or animals likely to come in contact with spray materials (Ibid., pp. 108-109).

Although TCDD is distributed in the forest environment as a contaminant in 2,4,5-T and silvex, the amount of TCDD (0.1 ppm) in 2,4,5-T is so small and spread over such a great area that exposure to a toxic dose is highly unlikely. Tschirley (1971) and the New Zealand Department of Health (1977) offer "worst-case estimations" supporting the remoteness of this possibility. Additionally, TCDD as it occurs in actual herbicide formulations degrades rapidly (within a single day), further decreasing the possibility of contacting a toxic dose.

3.3.5.2 Social

Concern will be expressed by individual citizens about potential adverse impacts on agriculture crops, garden crops, animals, domestic water supplies, and direct contact from drift occurring during spraying or pilot error.

Other individuals or organized groups regardless of location will protest the entire use of chemicals because their value system is based on the natural environment undisturbed by man-made chemicals.

Downstream water users, such as fish hatcheries, domestic water systems and irrigation draw off can also be expected to express concern about anticipated impacts of upstream herbicide use.

3.3.5.3 Application Methods

The chances of an applicator being exposed to contact with the herbicides being applied is remote if such chemicals are mixed and applied according to label instructions and with well maintained application equipment. However, in the event that leaks or splashings occur, it is probable that the highest degree of exposure is related to the following type of application in descending order; hand, backpack, truck and aerial.

3.3.5.4 Cumulative Impacts

Repeated exposures to herbicides may occur to applicators if their livelihood is herbicide application. Cumulative effects that impact human health are not expected. Bioaccumulation of TCDD (dioxin) in the food chain is a matter of a disagreement between scientists.

3.3.5.5 Conclusions

Material on the subject of the effects of TCDD is complex and there is not complete agreement among researchers. Impacts of its use on human health as a part of the proposed action are not known. However, the following conclusion concerning the proposed action may be made:

-- Potential for adverse human effects from the TCDD (dioxin) found in silvex is currently undergoing a formal review process by EPA. Some studies indicate that tumors and deformities result in test animals. An EPA committee has made the judgment that an adequate margin of safety does not exist for women of child-bearing age exposed to cumulative effects of dermal, oral and inhalation exposure of 2,4,5-T and TCDD. Therefore, it seems reasonable to conclude that silvex represents a potential long-term environmental risk.

-- A portion of the citizens living adjacent, in, or near proposed project areas will protest the use of chemical herbicides.

-- Hunters, berry pickers, hikers and other outdoor enthusiasts may cross through or recreate in areas recently treated with herbicides.

3.3.6 Socioeconomic Conditions

The majority of socioeconomic impacts result from changes in the amount of timber logged, hauled and locally processed into primary wood products such as lumber, veneer and plywood (Timber Harvest Impacts). Most details in Table 3-23 address the effect of changes in timber harvest. In addition, intensive forest development practices will have some effects on the local economy through "forest management jobs" as indicated in the same table.

The base against which impacts are measured is the projected situation without proposed changes in timber management (Current Management - Short Term, Table 3-23).

The column under Current Management entitled Long Term, presents estimates of the situation that would exist if no change were made in allowable harvest and in timber management. After 9 decades of timber sales at 146 million board feet per year, the sustainable yield level of timber sales would decline to 87 MM bd. ft. per year. (Since economic parameters such as timber price and labor requirements are not projectable to the distant future, projections of economic parameters to 1990 are used in this column as well as in Proposed Management - Long Term.)

To assist understanding of changes based on recent experience, a column in Table 3-23 presents effect of timber management in the recent past in the JSYU. The column is labeled Current Management - 1973-4-5.

Under the proposed timber management plan, both a first decade and long-term view are presented. The column under Current Timber Management - Short term is the situation that would exist during the first decade with "no change" in allowable harvest. Under Proposed Management, the column entitled Short Term is the projected situation with the proposed action during the first decade; Long Term is the situation expected to pertain after timber harvest reaches the long-term equilibrium, which in this case is during and after the second decade.

Comparisons involving other columns will reflect projected changes in: employment/timber processed ratios; total employment; timber supply from other sources; stumpage prices; assessed valuation of taxable property; and impacts resulting from changes in timber management. Isolation of the impact of changes in JSYU timber management only is provided by comparing estimates representing the same time period. For example, when data on the status of economic variables for 1980 projected under current management are compared with those for short term (first decade), the projected differences are attributable solely to proposed changes in timber management. Comparison of the 1973-4-5 situation with either of the columns of Table 3-23 under Proposed Management would reflect price changes, technology changes, population increases, and changes in assessed valuation of property, in addition to effects of changes in timber sales and forest development practices.

Data pertaining to Current Management mostly illustrate expected changes in factors beyond BLM control, e.g., if labor requirements remain constant, the short-term direct JSYU timber based employment would have be 1,166 rather than 957. Long-term equilibrium is defined as beginning at the point in time beyond which the graph of allowable cut neither rises nor falls. It is based upon planned harvest during the second decade for the proposal, and expected sustained yield for current management. Short term is considered to be during the first decade after announcement of the 10-year allowable harvest. Parameters used are based on 1980 for short term, and on 1990 for long term.

Under the heading "Timber Supply", Annual BLM Timber Sales

Table 3-23

Effect of Timber Management in the JSYU Upon Selected Economic Variables
Under Current Management and Proposed Management

Economic Variable	Units	Current Management 1973-4-5	Current Management Short Term	Current Management Long Term[1/]	Proposed Managment Short Term	Proposed Managment Long Term	Comparison of Proposed to[4/] Current Management Short Term % Change	Comparison of Proposed to[4/] Current Management Long Term % Change
Timber Supply								
Annual BLM Timber Sales (JSYU)	(MMBF)	126	146	87[5/]	103	94[6/]	- 29%	+ 8%
All Sources (Timbershed)	(MMBF)	555	609	557	578	562	- 5%	+ 1%
Employment (Direct)								
Timber	(Jobs)	885	957	501	675	541	- 29%	+ 8%
Forest Development[2/]	(Jobs)		7	7	42	42	+500%	+500%
TOTAL	(Jobs)	889	964	508	717	583	- 26%	+ 15%
Non-Local	(Jobs)	101	93	50	65	54	- 30%	+ 8%
Employment (Direct & Indirect)								
Josephine Co.	(Jobs)	942	1,028	545	800	657	- 22%	+ 21%
Percent Total for Josephine Co.	(Per Cent)	6.2%	5.7%	2.6%	4.4%	3.1%	- 22%	+ 21%
TOTAL Local	(Jobs)	1,615	1,751	923	1,303	1,059	- 26%	+ 15%
All Jobs (Local & Non-Local)	(jobs)	1,799	1,920	1,014	1,421	1,157	- 26%	+ 14%
Local Personal Income (1974 $)	($1,000,000)	27.7	32.1	19.1	22.7	20.7	- 29%	+ 8%
Public Finance (O&C Payments)								
JSYU Dependent O&C Payments								
O&C Area	($1,000,000)	4.9	11.2	8.9	7.9	9.6	- 29%	+ 8%
S.W. Oregon	"	3.0	7.0	5.5	4.9	6.0	"	"
Josephine Co. Area	"	0.6	1.4	1.1	1.0	1.2	"	"
Douglas Co. Area	"	1.2	2.8	2.2	2.0	2.4	"	"
Tax Rate Equivalence of O&C Payment								
O&C Area	($/$1,000 TCV[3/])	0.20	0.32	0.25	0.22	0.27	- 29%	+ 8%
S.W. Oregon	"	0.78	1.28	1.01	0.89	1.09	"	"
Josephine Co. Area	"	1.25	1.93	1.53	1.43	1.65	"	"
Douglas Co. Area	"	0.90	1.53	1.21	1.11	1.31	"	"

1/ Under Current Management long-term equilibrium is based upon expected harvest during the ninth decade and projections of economic parameters to 1990. Under Proposed Management, long term is based on planned harvest during the second decade and projections of economic parameters to 1990.
2/ Forest Development practices are based upon those actually conducted during the FY 72 through FY 77 period.
3/ TCV represents the assessed true cash value of taxable property.
4/ Comparisons were calculated as follows for each variable: 100 (Proposed Mgmt. - Current Mgmt/(current Mgmt.))
5/ Harvest declines to this long term stable level in the ninth decade
6/ This does not include any possible harvest from the low intensity lands
Note: Consult the introduction to this section for key parameters used, and for an interpretation of the Economic Variables.

(JSYU) is the amount of timber, in millions of board feet Scribner, to be sold annually from public land in the JSYU. The subcategory, All Sources (Timbershed), represents the estimated total annual timber supply from all forest lands in Josephine and Jackson counties (Beuter 1976). (Twenty-eight percent of the JSYU public lands are outside the timbershed. Josephine County includes by far the largest area common to both the timbershed and the JSYU.) The only adjustments made were based on proposed reduction in sales from public lands in the JSYU.

Full-time-equivalent employment (direct) is dependent upon timber harvest and processing, and forest development on public land in the JSYU. This dependence is generated through:

Timber: Logging and primary processing of timber.

Forest Development: Slash disposal (burning or gross yarding), tree planting, herbicide application, precommercial thinning, and fertilizer application.

Non-Local: Pulp, paper and board manufacture, elsewhere in Oregon, which is based on coarse wood residue from primary processing.

Timber employment estimates are based on logging and primary processing of timber. Employment/timber processed relationships are based upon analyses and projections presented in Appendix K. Local logging and timber processing ratios were: 7.02 for 1973-74-75; 6.554 for 1980; and 5.755 for 1990. Non-local (processing of coarse wood residue, chips, etc., elsewhere in Oregon) had ratios of: 0.802 for 1973-74-75, 0.634 for 1980, and 0.571 for 1990.

Forest development practices analyzed were: slash disposal (burning and gross yarding); tree planting (initial and replant); precommercial thinning; herbicide and fertilizer aerial application. Employment (direct and indirect) is the cumulative employment directly dependent on timber harvest from the JSYU. Employment estimates are developed from the direct employment effects, income and employment multipliers (BLM Socio Economic Data System 1978), and historic log flow patterns for the JSYU. Estimates of Josephine County impacts are based on 53 percent of the JSYU timber harvest being locally processed, and on all of the forest development based employment. Percent total for Josephine County is derived by dividing the estimated dependent employment by the total 1973-75 average employment, and projected (USDI BPA 1976) employment for 1980 and 1990, as appropriate. Total local is based on the sum of direct timber and forest development jobs which was increased by the weighted average employment multiplier for Douglas, Jackson and Josephine Counties. All jobs (local and non-local) include all avenues of direct employment (timber, forest development and non-local) increased by the same multiplier factor as for "total local" jobs.

Local Personal Income represents estimated wage and salary, proprietorship and other earnings based upon 1974 relationships estimated from Regional Economics Information System data (USDC January 1977) and increased by the factors (1.914 for Josephine, 1,530 for Douglas, and 1,736 for Jackson

Counties) used to estimate indirect income effects.

Public Finance (O&C Payments) is estimated to aid in understanding the likely impact of changes in O&C payments resulting from JSYU timber management upon property taxes paid, or via changes in public services. These O&C payment estimates are based on stumpage price estimates for BLM in western Oregon (adjusted by historic differential for Medford District sales) and projections using a 2.84 percent per year "real" price increase factor (USFS Timber Outlook 1974). Stumpage price estimates per MM bd. ft. were: $77 for 1973-4-5; $154 for 1980; and $204 for 1990. Stumpage price estimates for 1973-4-5 are based on sales of 1970-1-2: for 1980, estimates are based on 1977 sales. Since O&C payments are estimated on a consistent basis, they provide useful comparisons of alternative situations. (The actual future amounts may be much different, because they will reflect inflationary impacts on stumpage prices.)

Tax Rate Equivalence of O&C Payments represents the amount of tax that would replace the O&C payment, based upon taxable property assessments within the county. The estimate for 1973-4-5 was derived by dividing the estimated O&C payments for 1973-4-5 by the assessed True Cash Value (TCV) within appropriate counties as of 1973-74-75 and as of 1977 for the short-term and long-term estimates of payments. Stumpage price projections represent only relative price changes, the estimates of tax rate equivalence are based upon a consistent procedure; however, differential rates of increase in TCV could change the actual outcome. (Both stumpage price and assessed values will in the longer term change with the general price level. The stumpage price projection is, after 1980, net of general price increases. The assessed TCV is as of 1977, and is not projected.).

3.3.6.1 Analysis Guidelines and Assumptions

Analysis Guidelines

To analyze long-term impacts, a projection of timber output based upon the proposed action is developed. These projections provide comparison of the future with the proposal to the future without the proposal (i.e., with perpetuation of current timber harvest and management levels) which allows a comparison of the expected economic impacts. Consistent with that approach, effects of the changes in intensive forest development practices on allowable harvest are considered separately from changes due to reductions in the commercial forest land base and due to concessions to uses of the forest resource for purposes other than maximum timber production. In most cases the effect of the net change is presented, since the proposed action involves more than an adjustment in the allowable harvest.

The economic impacts due to increased/decreased timber sales and changes in operational systems will be presented separately. A change in allowable harvest will affect the level of employment in harvesting, hauling and processing activities, timber supply and public revenues. Analysis is primarily devoted to quantifying, within limits of credible information, the short and longer term economic and social impacts of changes in allowable harvest.

Because the effects of forest management practices are realized in timber harvest many decades later, it is important to consider the future beyond the human lifespan. Projections of national wood products needs and local economic structure beyond 2 or 3 decades are tenuous; therefore, quantification of long-term economic impacts is not attempted in this document.

The short-term socioeconomic impacts would become effective 3 to 4 years after implementation of a revised timber management plan. These impacts (first decade) are based upon parameters projected for 1980. Long-term impacts are based on parameters projected to 1990 where pertinent.

Individual persons, households, families, neighborhoods, towns, counties and multi-county regions would be affected by the proposed action. It would be impossible to determine which of the persons, households, families or neighborhoods would be influenced. The social/economic units for which impacts will be assessed are towns, counties and multi-county areas.

Employment and associated impacts will be analyzed within the context of counties or multi-county areas as appropriate. The Medford timbershed (Jackson and Josephine Counties, as defined by Beuter et al. 1976) is the geographic area for which projections of total timber supply are available. Timber supply impacts are discussed in that context.

Assumptions

Although demand for softwood products is affected by many changing factors, it is assumed that these changes will not diminish processing by local mills. At current relative prices, a sustainable rate of harvest by all owners will not exceed local capacity for timber processing.

The log flow pattern and mix of lumber, veneer and plywood, and chips and wood residue production and exports is assumed to remain as during 1972.

For timber from all ownerships, log flow patterns of 1972 will continue in future decades. Destinations of logs harvested from public lands in the JSYU will follow the same pattern as during 1973-75. Timber harvest is assumed to be evenly distributed over the sustained yield unit in the same pattern as BLM timber sales during the 1973-75 period.

Future timber harvests from other sources and employment generated per unit timber harvested and/or processed will follow patterns projected in Appendix K.

Employment per unit of timber processed will decline due to changing technology. Although this employment decline is independent of the proposed action it does influence the magnitude of the projected employment impacts.

The ratio of employment to population in Josephine County will remain at 0.35, the 1976 level. This assumption is needed to estimate the effect of changes in employment level upon emigration, hence population. Real per capita personal income will not deviate significantly from the 1975 level of $4,478.

Stumpage prices per MM bd. ft. are reflected in O&C payments 3 years after the year of the sales.

3.3.6.2 Timber Harvest Impacts: Short Term

The short-term impact of reduced harvest would be gradual as a result of standard terms of timber sale contracts, which allow a maximum of 36 months between date of sale and completion of harvest. The employment effects would not be fully realized, therefore, until 3 years after the effective date of the proposed allowable harvest and signing of subsequent sales contract. Announcement of the timber management plan may cause some immediate instability due to shifts in long-term expectations; however, substantive and persistent reasons for economic adjustment would not occur for 2 to 4 years.

Timber Output

Volume

Compared to the existing cut, the proposed action represents a 43-million-board-foot reduction in annual allowable sales during the first decade, a 29 percent reduction. Timber processing from BLM sales in the JSYU would be reduced by approximately 23 MM bd. ft. in Josephine County (Merlin 12 MM bd. ft. and Grants Pass 1 MM bd. ft.), 17 MM bd. ft. in Douglas County (Glendale) and 3 MM bd. ft. in Jackson County (Medford). These reductions amount to 15.7 percent of the 1976 estimated rates of timber processing for Josephine County, 1.5 percent for Douglas County, and 0.5 percent for Jackson County (Howard 1978).

For Glendale, in Douglas County, the reduction in amount of timber available for processing would account for 9 to 13 percent of total mill capacity. The percentage would vary from year to year based on location of the timber to be harvested and needs of the timber purchaser.

For southwest Oregon (Coos, Curry, Douglas, Jackson and Josephine Counties) the reduction would represent 1.5 percent of the total 1974 harvest from all lands (Table 2-37).

Softwood sawtimber production (1970) from forests in the United States was 46.2 billion board feet, International one-eight inch rule (USFS 1974, p. 211). The loss of 43 million board feet in annual sales from the Josephine SYU would represent less than one-tenth of 1 percent of the national harvest.

It is not possible to anticipate the cumulative impact from all western Oregon forests managed by BLM until the land use plans are developed from which the allowable harvest plan for each sustained yield unit is set. To put the harvest in perspective, the BLM total allowable cut from BLM-managed western Oregon forests has been approximately 1.2 billion board feet. During the years 1973-75, the volume of timber harvested in western Oregon originating from public lands ranged between 609 MM bd. ft. and 1,455 MM bd. ft., which were 11 and 20 percent of the western Oregon totals for those years. The total harvest from public lands in western Oregon accounted for 2.8 percent of U. S. harvest during 1970.

Price and Cost Impacts

Based on estimates of lumber demand elasticities (USFS July 1974, p. 150), a reduction in timber harvest from the JSYU would reduce the national quantity by about one-tenth of 1 percent, and would

increase the 1970-based price of Douglas-fir lumber by 88 cents per thousand board feet (International one-eight inch).

Regarding probable inflationary impact, the change in softwood product prices (based on the 1976 level of Douglas-fir lumber prices) would be $1.63 per thousand board feet, for an annual total of $50 million. Impact upon the cost of living index will probably be negligible, since the total cost increase would be less than four thousandths of 1 percent of the 1976 national income.

The above price- and cost-related impacts are based on a 1-year (short-term) adjustment. For price to respond to a shift in quantity, 10 years is long term. According to The Outlook for Timber (p. 150), price response to a shift in quantity available is expected to moderate to one-fifth the magnitude of a short-term price impact due to product substitution and other compensating effects inherent in resilience of a market economy.

Increases in the cost of building a house 1 year after the proposal's implementation would be less than $100 dollars. Our rough estimate, based upon data from The Outlook for Timber, July 1974 (pp. 159 and 332), is $14.98 per housing unit (one- and two-family housing), with a 1-year adjustment period. Given 10 years for market adjustment, the cost impact in 1970 dollars would decline to $3.00, 20 percent of the initial year effect.

Employment Impacts

Employment estimates are based on comparison of the proposed action with the situation that would exist if BLM's allowable annual sales did not change. It is assumed that other sources of supply would produce as estimated by Beuter et al. January 1976 (Appendix K). Another factor is that employment per unit of timber logged and processed is declining and is expected to continue. Beuter projected an approximately stable availability of timber for the Jackson and Josephine County area (less than 0.1 percent decline per year over 100 years) except for a temporary 18 percent drop-off during the 1995-2005 decade.

Direct Employment

In this section, direct employment in "primary wood products" processing is developed from data for logging (SIC 2411), sawmills (SIC 2421), and veneer and plywood mills (SIC 2436). For the Medford timbershed, the above categories accounted for 84 percent of lumber and wood products (SIC 24) employment during 1972 (Wall 1977).

Forest development jobs would increase by 35, for a net change in local timber jobs in the three-county area of minus 247. The direct employment impact via lumber and wood products would be the loss of 282 jobs in Josephine, Douglas, and Jackson Counties. Reduction in the processing of wood products residue for pulp and paper elsewhere in Oregon would be 28 jobs. Employment for the Medford timbershed is projected (see Appendix K) to decline from the 1968-73 level, even though total harvest is projected to increase slightly during the next decade (1975-85). The reason for the decline in employment requirements is an increase in labor productivity

(Wall 1975) resulting from phasing out of old plants.

Based upon observed log flows, direct employment losses in Josephine, Jackson, and Douglas Counties would be 114 (including 35 new jobs in forest development), 23, and 110 respectively. These reductions account for 5.4 percent, 0.4 percent, and 1.4 percent of 1975 direct timber-harvest and forest development dependent employment in those counties respectively.

The 0.8 percent change in employment (all sectors) for Josephine County attributable to the proposed timber management plan would be phased in according to terms of the timber sale contracts. The 5 percent adjustment in lumber and wood products employment which would result from the proposed action would have significantly fewer short-term impacts on workers and their families than the 11 percent (Table 2-32) year-to-year variation experienced during the 1970-76 period.

Total Employment

Total employment impact is defined as the sum of direct and indirect employment shift resulting from the proposed action. Indirect employment includes, for example, employment in services, retail trade, and further processing of wood products. To estimate such impacts, the employment factor (Appendix K) and the personal income and employment multipliers for lumber and wood products of 1.75 and 1.82 respectively (weighted average for Josephine, Douglas, and Jackson Counties) were used to adjust direct employment losses for each county (Social-Economic Data System [DYRAM] special run 6/13/78) based on 1974 data. Total (direct plus indirect) employment reduction (including the entire JSYU) due to the proposed action would be 512 local plus 51 employees related to processing of coarse residues in pulp and paper (outside the Medford timbershed). However, 64 forest development related jobs (direct and indirect) would be created in Josephine County which leaves a net employment reduction of 448 local jobs.

Based on log flows, the net total expected employment losses implying forced worker readjustment would be 207, 41, and 200 for Josephine, Jackson, and Douglas Counties respectively; 51 jobs would be lost elsewhere in Oregon.

As percentages of 1980 projected average employment (all sectors) in Josephine, Jackson, and Douglas Counties, the projected reductions are 1.2 percent, 0.08 percent, 0.6 percent respectively. These percentages reflect the compensating effect of increased employment in forest management and the local multiplier effect.

In summary, the direct employment effects of reduced timber harvest would aggravate the projected 11 percent decline in primary lumber and wood products employment (Appendix K) during the next decade from reduced labor requirements per unit of wood products processed.

Incidence of Job Losses

Stevens (April 1976, p. 114) reported with regard to projected Statewide employment declines in the timber industry in Oregon:

As employment levels decline, the core labor force will be at an advantage due to greater seniority and access to job information. Thus, the costs of a major employment decline will be borne primarily by the peripheral labor force. They lack the attributes required to get the remaining wood products jobs, especially seniority.

The advisability of major changes in timber harvest policy, then, depends on the capability of the larger economy to absorb those peripheral workers who become excess to the needs of the industry. This capability for absorption depends in part on a healthy national economy; the peripheral labor force suffers from recession through both layoffs in wood products and reduced job prospects outside the industry. The fate of peripheral workers will also depend greatly on the capabilities of local economies to absorb excess labor; this capability may vary substantially among communities.

Data regarding the relationship between total employment and employment in lumber and wood products for Oregon, Douglas County, Jackson County, and Josephine County revealed a differential response to short-term employment increases versus declines. As wood products employment increased, total employment sharply increased; however, when wood products employment declined, total employment declined much smaller proportions (than from an equivalent increase). This difference may reflect a tendency for unemployed workers to move into alternative employment.

For Josephine County, the number of families experiencing trauma of employment reductions due to the proposal, however small, would be accentuated by the recent experience of extremely high levels of unemployment compared to other Oregon counties (Table 2-42) and moderated by the lag of up to 36 months between timber sale and harvest. At the time the action is implemented, a maximum 3 year backlog of sales, based on the existing harvest plan will, under normal conditions, exist.

The 3 year backlog would provide a pool of previously sold timber, acting as a buffer, and could soften the transition from the existing level of timber sales to the proposed level. The pool of previously sold timber would probably modulate employment impacts, depending upon harvest timing decisions of the timber buyer.

Community Personal Income Impacts

Estimates of the local personal income impact are based on earnings per wage and salary employee and, independently, on personal income per thousand board feet. During 1974 the weighted average earning per wage and salary employee was $10,845 for Josephine, Jackson, and Douglas Counties (Oregon Department of Human Resources 1975). Direct and indirect personal income per thousand board feet, weighted average, was $186.70 for Douglas, Jackson, and Josephine Counties. Weights used were based upon JSYU log destinations.

For the three-county area, community personal income (direct and indirect personal income received by

residents) as a result of timber harvest and related processing would decline by $4.2 million to $8.0 million during the period that sales, based on the proposal, would phase into the harvest cycle. The low estimate is based on wage and salary employees only and does not include entrepreneurial income. The high estimate implies that the average community personal income exceeds by 70 percent the income received by "covered" wage and salary workers. There is a high probability that the actual effect falls between the two estimates; however, there is no objective basis for using a single number to reconcile the two estimates.

Earnings and proprietorship income for 1974 would be reduced in Josephine County by 2.3 to 4.4 percent; Jackson County by 0.1 to 0.3 percent; Douglas County 0.4 percent to 1.5 percent.

The projected declines in total personal income are for the entire community. Individual workers and their families may suffer severe impacts (up to 100 percent) if their principal means of support is a job in primary lumber and wood products. Retained workers may not experience any effect on earnings resulting from the proposal. Firms providing goods and services in support of lumber and wood products industry would experience minor declines in business potential even smaller than for community income in aggregate.

Adaptation by resident workers and proprietors to changed earnings and employment opportunity would be within the 10 year term of the allowable harvest plan. Immediately noticed effects would be reduction in the labor force through emigration, increased unemployment, or increased underemployment.

A study of Oregon wood products workers adaptation to job loss indicated that with regard to personal income:

> One cannot simply assert that the relative income position of [Wood Products] workers will remain constant as employment levels follow their projected decline; this remains an untested proposition since substantial employment declines [long-term reductions] have yet to occur (Stevens 1976).

It is also clear that income impacts would depend upon the availability of alternative employment.

For Josephine County, the burden of any decline in per capita income may be especially severe since per capita income levels have been among the lowest of Oregon counties during recent years. Figure 2-29 illustrates this fact.

Population Impacts

Population impacts of the proposed action depend upon employment impacts and adaptation responses of workers. These also depend on the availability of local alternative jobs. If local employment alternatives are unavailable, the longer-term adaptation would be either acceptance of lower income or movement to another community where a job is available.

In the absence of local employment alternatives and assuming 2.9 persons per job (the worker, plus 1.9 dependents), and that underemployment is unacceptable to the affected workers, the total displaced population would be 120 for Jackson County, 600 for Josephine, and 580 in Douglas. These estimates include secondary impacts. Inasmuch as the estimates assume there are no alternate local jobs, they indicate the extreme maximum induced emigration: 1,300 people for the three counties.

Based upon findings by Stevens that the peripheral wood products labor force is comprised of highly mobile workers who tend to be younger than the average for the population, a decline in resident population in the 18 to 30 age group would be expected. In addition, since many of the peripheral labor force members are young and/or students, the non-worker population per peripheral worker would be smaller than average; the estimate of maximum induced emigration by 1,200 persons is probably high.

Public Revenue Impacts

Under the O&C Act, 50 percent of receipts from timber sales are distributed to county governments. For each $100 reduction in receipts from harvest of O&C timber, the county governments of Coos, Curry, Douglas, Jackson, and Josephine would lose $2.95, $1.83, $12.53, $7.84, and $6.04 respectively for a total of $31.19. The remaining O&C counties, none of which is in southwest Oregon, would lose a combined total of $18.81 for each $100 reduction.

Twelve percent of BLM's allowable harvest in western Oregon currently occurs in the JSYU. Stumpage prices for timber from Medford District averaged about 84 percent of average stumpage prices received by BLM for western Oregon timber during 1973-75. BLM sales account for approximately 90 percent of total timber sale receipts from O&C grant lands. Based upon the above relationships, approximately 9 percent of O&C payments to counties were based upon timber sales from the JSYU. If Medford District stumpage prices increase to 90 percent of the average for timber sold from public lands in western Oregon, (the trend since 1966 has been toward narrowing of the difference in stumpage price), the proposed timber management plan would reduce the proportion of O&C payments to counties attributable to the JSYU from 9 percent to approximately 6 percent. Receipts by county governments from O&C payments, therefore, would decline by approximately 1.6 to 2.2 percent of the amount that would be received by harvesting at the current average rate of 146 million board feet per year.

Based upon stumpage price of $144 per thousand board feet (84 percent of the $171 per million board feet sales, the western Oregon BLM average for FY 1977), Josephine County O&C receipts potential would decline by $374,000 per annum (43,000 x $144 x 0.0604) during 1980. With the 1980 projected stumpage price of $154 per thousand board feet, the receipt potential would decline by $370,000. For comparison, Josephine County received $7.1 million in such revenues during FY 76 and $12.8 million during FY 77 under the current allowable harvest. About $1 million of the $12.8 million received by Josephine County during 1977 was based on sales from the JSYU. Southwestern Oregon counties

would experience an aggregate reduction of approximately $2.1 million, compared to O&C Act revenues of $66 million in FY 77. For all O&C counties combined, the reduction in potential revenues (based on a reduction of 43 MM bd. ft. in harvest) would be approximately $3.3 million of $106 million disbursed to counties during FY 77.

Based on comparison of current management with proposed management (Table 3-23), the short-term difference in average annual total O&C payments would be 3.3 million dollars. For Josephine and Douglas Counties, the comparable difference would be approximately $400,000 and $800,000 respectively. The projected average annual O&C payments generated by the proposed JSYU timber harvest would be approximately the same as for 1977. Comparable average O&C payments during 1973-74-75 were about 3 million less than those annually projected for the first decade under the proposed action.

Any property tax rate increases to compensate for the reduction in potential receipts for all O&C counties combined would be 10 cents per $1,000 assessed valuation. For the southwest Oregon counties the combined property tax increase to restore the loss in potential local public revenue would be 39 cents per $1,000 assessed value, whereas for Josephine and Douglas Counties it would be 50 and 42 cents respectively. In contrast, O&C revenues to county governments have nearly doubled from 1976 to 1977, so county revenues would probably not decline as a result of the proposal.

3.3.6.3 Timber Harvest Impacts - Long Term

The purpose of the timber management plan is to maximize long-term timber production, while stabilizing harvest opportunities. The even-flow criterion implies that the welfare of future generations is considered equally important as that of current generations. In addition, the "non-declining" aspect of the rule implies that if any errors are made, they should be made in favor of future timber availability and long-term stability of communities.

Employment and Personal Income

Reductions in employment and local personal income resulting from the reduced harvest would persist for many years. However as machinery replaces labor in the timber milling processes, the employment and income declines attributable to the proposal would be less noticeable. In the longer term, after 9 decades, employment and income would exceed that expected without the proposed action.

The proposed action would reduce local personal income in approximately the same proportions as it reduces employment. Unemployment compensation would provide a temporary income support for displaced workers. Any normal per capita income increase from national economic conditions would tend to be dampened (dependent upon the extent of emigration versus underemployment). Duration of the dampening effect is unknown.

Employment Stability

As recognized in the short-term impact section, employment related to timber harvest will decline due to

changing technology. This element of decline is independent of, and would not be modified by, the proposed action; however, it does influence the projected impacts.

Logging and milling of timber has historically been an unstable industry, subject to rapid changes in prices and demand, a fact that is reflected in the year-to-year vacillations of employment in the Josephine County economy. Aggravating this situation, the proposed action would put people out of work who would find insufficient substitute jobs in local areas and would have to accept either underemployment or emigration. However, this impact is a short-term one. Much worse would be the long-term, perhaps even indeed permanent, reduction in employment that would follow if the harvest were maintained at its present higher level. Continued existence of the peripheral labor force, a mobile labor pool that enables loggers and millers to respond swiftly to changes in the wood products market, is unlikely to be affected by the proposed action.

The plan would have a decade-to-decade stabilizing influence on the economy of local timber dependent communities. Stabilizing influences of the proposed action, however, would be a minor factor even for Grants Pass and Glendale. Year-to-year changes induced by timber industry related factors have been much larger (Section 2.1.3.5). Annual timber harvest in Josephine County during 1965-75 ranged from a minimum of 106 MM bd. ft. in 1971 and 1975 to a maximum of 194 MM bd. ft. in 1972. For Jackson and Josephine Counties combined, during the same period, the maximum harvest (755 MM bd. ft.) was during 1972, and the minimum harvest (429 MM bd. ft.) was during 1975. The above variability, presumably due primarily to market factors, far exceeds the expected timber volume impact of the allowable harvest plan. During the past decade there has been no discernible trend. The proposed action would shift the multi-year average harvest by an amount considerably less than historical year-to-year variations.

In the longer term (beyond 10 years) continued harvest of the 9 MM bd. ft. per year from low intensity lands is contingent on the results of the 10 year trial program on these lands. If such harvest is discontinued the reduction would be less than 2 percent of the projected level of timber harvest in the Medford timbershed and would be responsible for eliminating less than 250 total (direct and indirect) jobs in the destination communities. Assuming no alternative jobs and preference for mobility over underemployment or reduced earnings, at most an additional 725 persons would emigrate.

Public Revenue

Public revenues in the counties receiving substantial payments from Federal timber sale receipts are unstable due to rapid responses by logging and milling firms to shifts in the market for softwood products. Factors contributing to instability include both stumpage price and quantity harvested. The proposed decline in timber sales would cause a reduction in timber receipts. Recent experience, however, has been that stumpage price increases have compensated for short-term timber harvest declines. In the longer term, public revenues from the proposed action would be more than those

without the proposal because of enhanced long-term timber yield.

The 9 MM bd. ft. reduction of total timber sales between the short term and the long term would cause a decline in total O&C payments of less than 0.9 million dollars.

3.3.6.4 Forest Development Impacts: Short and Long Term

Planting would be conducted at an average rate approximately 5.0 times that of the existing practice (6,250/1,263 = 4.95).

Tree planting would require labor equivalent to 20 full-time workers annually per year. The local jobs would be seasonal for approximately 4 months. During the typical season, 81 (an increase of 75) workers would be employed for 4 months. Slash disposal (burning and gross yarding) would create a full-time-equivalent of 15 jobs per year. Probably most of the employees hired would be local residents. Fertilization (aerially applied) and control of competing vegetation (predominantly aerial application of herbicides) are both capital-intensive and would have minimal direct impact on local employment opportunities. The labor intensive practices would probably create an increase of 35 jobs, for a total of 42 full-time equivalent jobs due to forest development practices.

Without the forest development features of the proposed action, i.e., those that are deviations from existing practice, timber harvested from the JSYU would be about one-third less than is proposed. By the year 2020, this reduction would account for approximately 190 local jobs. In the first decade, the same difference in annual harvest would account for approximately 300 jobs. The difference results from the projected decline in labor requirements in primary wood products processing.

3.3.6.4 Conclusions Regarding Significance

Short Term

The socioeconomic impacts judged to be significant are limited to the impacts on individuals and households resulting from the trauma of added uncertainty regarding employment and income stability, and of adapting to employment losses. A net of approximately 448 local jobs would be eliminated as a result of the proposed action. Employees of sawmills and veneer and plywood mills in the Glendale-Merlin-Grants Pass area are most susceptible to job loss resulting from the proposed action. (If reductions in work force were assigned to workers by lottery, wood products workers in the Glendale, Merlin, and Grants Pass areas would have a 3 to 5 percent probability of losing their job. Because of voluntary job separations, the exposure to involuntary layoff is less than 3 to 5 percent.)

Employment and income impacts would be concentrated in the local area, contrary to the effect on wood products markets which would be diffused throughout the national market. Housing cost and other commodity output related impacts are judged to be insignificant. Cost of a single family residence would increase by less than two-tenths of 1 percent. Quantity reductions would be less than one-tenth of 1 percent.

Actual impacts on public revenues and public services delivery would be insignificant because stumpage price

increases are expected to provide for increased O&C payments, compared to the existing situation. Projected O&C payments would be less under the proposed action than with an extension of the existing situation.

The effect on property taxes for a $40,000 residential property in Josephine County would be insignificant. When comparing the projected situation with-and-without the proposed action, the maximum increase in the tax equivalence would be 20 dollars. In comparison of the existing situation with the proposal, the property tax equivalence on a $40,000 property would be a 7 dollar reduction.

Effects of the proposed action on employment stability and social stability are judged to be significant even though recent variations in harvest in Josephine County exceed those expected to result from the proposed action. This judgment is based upon indications of existing employment and social instability manifested in high (compared to Oregon) incidence of poverty, divorce, and unemployment, and low per capita income. Contrary indicators are low crime rates.

Long-Term

Projections are for a favorable impact on wood products supply, housing construction costs, employment stability, and local public revenue. These impacts are judged to be significant in their effect upon the long-term human environment, even though they would not be realized for many decades, since they are expected to be perpetually recurring.

3.3.7 Energy Usage

Due to the types of equipment employed and the level of treatments included, the proposed action would be considered energy intensive. Table 3-24 indicates the energy investment required, as expressed in British thermal units (Btu's). Energy required for processing of logs into lumber, plywood, etc., is not included since manufacturing costs vary widely depending on mill efficiency. The secondary energy investment for milling is 62,000 Btu's per dollar of manufacturing cost.

The annual energy consumption attributable to the proposed action would be 1.308 trillion Btu's, approximately 15 percent of the total end use energy consumption in Josephine County during 1972, the latest year for which the U. S. Department of Energy (DOE) has baseline data. Of this, 1.243 trillion Btu's, or 95 percent of the total, is attributable to development and care of road systems (construction, reconstruction, surfacing and maintenance) and log production. Such operations involve heavy equipment and machinery, the energy efficiency of which is dictated by available technology. Less than 5 percent of the total consumption, approximately 65 billion Btu's, is due to other manangement practices of the proposal.

If the 1.308 trillion Btu's identified in Table 3-24 were all expended in the form of gasoline, it would equate to 10.5 million gallons, or 0.8 percent of the 1.362 billion gallons of gasoline consumed in Oregon during 1977.

Table 3-24

Estimated Annual Energy Consumption Attributable to the Proposal

Treatment	Units	Estimated Cost per Unit ($)	Assumed Energy Requirement per $ of Cost (1,000 Btu's)	Energy Consumption (million Btu's)
ROADS				
New Construction	50 miles	$23,000	80	92,000
Reconstruction	10 miles	10,000	60	6,000
Surfacing	5 miles	10,000	50	2,500
Maintenance	350 miles	500	54	9,450
LOG PRODUCTION (all actions taken to cut trees and get logs to the mill)	103,000 M bd.ft.	200	55	1,133,000
SLASH DISPOSAL				
Burning	1,010 acres	27	31	845
Gross Yarding	3,350 acres	56	31	5,861
HERBICIDE				
Site Preparation	3,450 acres	25	122	10,522
Release	1,320 acres	25	122	4,026
PLANTING	6,250 acres	125	31	24,219
THINNING				
Precommercial	1,320 acres	50	31	2,201
Commercial	470 acres	(included with Log Production)		
FERTILIZATION	1,890 acres	75	122	17,294
TOTAL				1,307,918

NOTE: BLM estimated costs per units were often a range of values. The listed costs were selected as indicative of the JSYU situation. Similarly, DOE energy requirements were also given as a range in some cases.

Sources: BLM data except for Assumed Energy Requirements per Dollar of Cost, which was derived from data furnished by Frank Brown, U.S. Department of Energy, Region X.

3.4 EXISTING LAND USE

Livestock grazing would be minimally impacted by the proposal. Harvest and specific forest development treatments may take place on portions of the present grazing area. Impacts would be short term and alternative grazing areas are available.

Road construction would require quarry products anc could result in land use changes. Secondary impacts of safety hazards associated with driving on logging roads could occur.

Any wilderness values which may exist on O&C lands capable of sustained yield harvest would be adversely impacted.

There are no significant impacts that would endanger the characteristics of the Rogue River which were recognized by its placement in the National Wild and Scenic Rivers System.

3.4.1 Grazing

In the JSYU, 9,399 acres are leased for livestock grazing. Figures are unavailable on how much public lands leased for grazing are in the commercial forest base. If all of it were in the base, only a small portion would be involved in a timber sale or regeneration program in any one year or grazing season. Impacts are minimal since alternate areas are available as temporary replacement grazing units for the nine leasees to continue 456 AUMs of forage utilization.

Worst case situation analysis discloses several ways in which grazing could be impacted. It is highly unlikely that any of them will be significant either individually or in combination. Possible impactors include the following:

- Road construction removes forage vegetation. Roads, however, provide access to additional forage areas.
- Dragging logs, slash burning, herbicide usage to encourage commercial coniferous species, and scarification remove forage at least temporarily.
- Logging slash, prior to slash disposal, reduces livestock access to forage and increases the possibility of leg injury to foraging animals.
- Burning, herbicide spraying, scarification, regeneration planting, and fertilization can result in changes in the herbaceous and shrub vegetative layers which affect the quality and palatability of forage.
- Reforested areas may be fenced to protect the seed or seedlings from animal damage, including livestock. These areas would be lost to grazing for at least 5 years.

3.4.2 Transportation and Utility Networks

Construction of 500 miles of new roads would obviously change the land use from forest to transportation. However, the overall land use category is timber management and logging roads are a part of that land use category. Thus, impacts to the land use category would not occur.

Construction or reconstruction of approximately 600 miles of permanent road during the proposal period alter traffic patterns in existing roads. Changes would be attributable to both timber management and recreation seekers bound for newly opened areas.

Resulting impacts would be safety hazards due to increased vehicie numbers, dust, and noise. Impacts of recreational use on forest areas made accessible by the new roads are discussed in Section 3.3.1.

Traffic volume on existing transportation routes may also be affected. The proposed reduction in allowable cut could cause a reduction in the number of logging trucks on secondary highways. This should result in minor beneficial impacts to road conditions.

3.4.3 Mining

Construction of roads would require quarry products and could result in an increase in gravel and/or rock pits. Impacts of any change in land use are unknown.

3.4.4 Recreation

3.4.4.1 Rogue Wild and Scenic River

Significant impacts to the water quality of the Rogue River would not be anticipated as a result of the proposed action (Section 3.1). Therefore no decrease in the recreational and wilderness values of the Rogue as a wild and scenic river is expected to occur as a result of water quality impacts.

Scenic, recreational, geologic, wildlife, historic, and cultural values within the Rogue River corridor are protected under terms of the Wild and Scenic Rivers Act, Public Law 90-542. The preservation of lands within one-quarter mile of the river's banks would prevent visual intrusions in proximity to the Rogue. Furthermore, naturally occurring vegetation and terrain within the corridor enhances the visual setting and provides sound screening and visual isolation. Timber management activities would not impact any of these existing Rogue River protection measures. No impacts would occur to the visual foreground of the Rogue River trail or the river itself, as no timber harvesting is allowed within the designated wild river corridor.

Within the visual middleground or background, careful harvesting and properly located roads, in accordance with BLM visual resource management principles, would not be visible from the river or trail. The sound of equipment during harvesting may be heard, and some dust may be visible. This noise and dust, while unpleasant to some recreationists, would not substantially interfere with public use and enjoyment of values for which the Rogue River was included in the National Wild and Scenic Rivers System.

3.4.4.2 Other Recreation Lands

Existing recreation sites on BLM lands would not be directly impacted

by the proposed action (see Section 3.3.1).

The proposed action would have no immediate impact on identified potential recreation sites (Table 1-5). No harvest would occur on 1,300 acres of identified potential sites until an inventory has been made to determine if these sites are still needed and useful for recreation.

3.4.5 Wilderness Values

There would be no significant impacts to wilderness values within the designated Wild Rogue Wilderness. Lands capable of sustained yield management within other roadless areas having wilderness characteristics are subject to timber harvest and would not be maintained as wilderness under the proposed action (see Appendix L, the Solicitor's memorandum on the applicability of the O&C Act having dominance over Section 603 of FLPMA). Whether there are any such lands is not known, since a wilderness inventory has not been conducted. If such lands exist in the JSYU, they would be severely and adversely impacted by the proposal.

A high proportion of the 2,000-acre Red Butte area is high intensity forest management land; timber harvest would have a severe and adverse impact on its primitive values and any potential of the area for wilderness.

Portions of Big Windy-Bunker Creek are also high intensity and low intensity forest management lands. Harvest and related activities would severely and adversely impact the primitve values and any potential for wilderness. That portion of the area within the Rogue Wild and Scenic River corridor would not be impacted.

The majority of the 2,090 acres of roadless land adjacent to the Brewer Spruce RNA is high intensity timber management land. Timber harvest and related activities would have a severe and adverse impact on any wilderness potential these lands may have.

3.4.6 Miscellaneous Land Uses and Designations

No significant impacts are expected to occur to miscellaneous land uses except for the uses described below.

3.4.6.1 Research Natural Areas

The proposed action is not expected to impact the existing Brewer Spruce RNA, or affect the potential of Eight Dollar Mountain or Woodcock Bog. Brewer Spruce RNA is being studied by BLM for expansion. Part of the adjacent area contains some forest lands capable of sustained yield management. Since these lands are included in the timber production base, they are subject to harvest. Harvest and associated activities would have a severe and adverse impact on any potential expansion of Brewer Spruce RNA into this area.

4. MITIGATION MEASURES

The measures analyzed in this chapter are actions that would reduce or eliminate adverse impacts of the proposed action as identified in Chapter 3. These mitigation measures are taken in addition to those included in project design features of the proposal (Section 1.6). Each measure is described and impact reduction quantified to the extent possible. All measures are considered feasible with existing technology and would be required if the proposed action is implemented.

4.1 SILVEX BUFFER STRIPS

The herbicide silvex (2,4,5-TP) will not be aerially applied within 200 feet of any stream or water body.

4.1.1 Water Quality

Although widening the buffer strip along all streams and water bodies to 200 feet may not reduce the amount of silvex sprayed over the decade, it would have beneficial impacts on water quality. Because silvex is rapidly degraded, and dioxin is very strongly adsorbed onto soil particles, the possibility of water contamination by silvex, its degradation products, and dioxin is greatly reduced by this mitigation measure. Diesel oil contamination would also be reduced.

4.1.2 Aquatic Environment

As indicated in Section 3.2.4.4, minor amounts of dioxin would enter the aquatic environment. This would be lessened by a significant, but unquantifiable amount due to the mitigating measure (see Section 4.1.1).

4.1.3 Human Health

Effects of dioxin on human health are under investigation by EPA. It is assumed that adverse effects, if any, on the human population living downstream from spray areas would be reduced by the 200-foot buffer strip. The presence of such strips should also reduce some of the concerns local residents have about the herbicide contaminating their water sources.

4.2 SALVAGE LOGGING IN CLASS I STREAM BUFFER STRIPS

The 100-foot buffer strip along Class I streams (see Table 1-10, Issue I) will be managed to benefit wildlife. No harvest will be permitted except to benefit wildlife (e.g., remove windthrown trees blocking streams) or to salvage dead trees after a devastating fire. Approximately 1,600 acres in Class I stream riparian zones are involved.

4.2.1 Water Quality

Elimination of all salvage harvest but that beneficial to wildlife along Class I streams would reduce sediment introduced to the streams.

As much as 15,000 tons of sediment might be introduced into streams from the 1,600 acres of buffer strips if all 1,600 acres were salvage logged during the decade. In actuality, salvage logging as a result of the proposal would be more modest. Thus,

reduction of sedimentation due to the measure would not be very significant.

4.2.2 Animals

The measure may preserve additional although limited amounts of old growth and riparian habitats than would be expected from the proposed action. Opportunities for habitat to accommodate cavity dwellers would be a primary benefit of the measure. The impacts on terrestrial wildlife will be somewhat less.

Since the measure does not accomplish significant reductions in impacts on water quality (Section 4.2.1), there would be little change in the previously described impacts on aquatic animals.

4.3 NORTHERN SPOTTED OWLS

As discussed in the endangered and threatened species portion of Section 3.2.4.1, BLM has adopted the Oregon Endangered Species Task Force guidelines on habitat protection for specific numbers of spotted owl pairs. The task force determined that 400 breeding pairs, spread throughout its range, was adequate to provide a gene pool for perpetuation of the species. Medford District was assigned 14 pairs as their share of the BLM quota. The proposed MFP designates six pairs to be protected in the JSYU (see Table 1-10, Issue III).

It is implicit that other pairs of northern spotted owls may have their habitat reduced or eliminated if they are located in areas where timber harvest takes place. The impact discussed in Chapter 3 relates to these pairs which are not necessarily provided with protected habitat.

Two mitigation measures are to be employed. The first provides for initiation of a monitoring program, jointly with the Oregon Endangered Species Task Force and its affiliated agencies, to determine the reaction of spotted owl pairs displaced or disturbed by logging and logging operations. Resultant knowledge acquired will give a better insight on the adaptability and potential for emigration of the species.

The second measure relates to timing of harvest so as not to interfere with nesting and the raising of young owls to the age of self sufficiency. Therefore, in the event a spotted owl nest is located in a sale area, the following protective measures would be used.

A. If the nest tree is within a clearcut unit, no cutting or road building will be conducted during the period 1 March to 1 July.

B. If the nest is located in an area scheduled to receive shelterwood harvest, an area 15 acres around the nest tree will remain uncut during the March-July period.

Although quantification of these measures is not possible, it is felt that they will, to a limited extent, mitigate impacts of the proposed action.

5. ADVERSE IMPACTS WHICH CANNOT BE AVOIDED

Chapter 5 presents an analysis of the unavoidable adverse impacts that would result from implementation of the proposed action with the mitigation measures presented in Chapter 4. Adverse impacts are those of the worst case scenario identified in Chapter 3. Project design features discussed in Section 1.6 constitute best management practices employed for each treatment, and design features are specifically selected from among a wide variety available to meet the situation on each individual treatment area.

The proposed action constitutes a reduction in volume to be harvested; therefore less area is subjected to logging treatments. Forest development practices, however, are increased over present levels.

5.1 PHYSICAL ENVIRONMENT

5.1.1 Climate

Areas subject to logging and construction activities would undergo an increase in temperature extremes, both daily and annually. Daily increases would go from an average 15 to 20 degree variation to as much as a 70 degree (F) variation in surface temperature (within 2 inches of the ground surface). Annual variations would increase by as much as 25 degrees due to exposure to direct sunlight in summer, and radiation cooling with cold air drainage in winter. These impacts are significant, possibly effecting vegetation regeneration and seedling mortality ratios.

Relative humidities in the areas subject to logging would decrease from present ranges of 45 to 95 percent of saturation to ranges of 20 to 95 percent of saturation. Increased exposure to wind and convective air movement would cause more evaporation of existing moisture; greater variation in humidity would result. Summer drought conditions would prevail in areas previously protected by forest vegetation. These effects would be of significance in reforestation success.

Air movement would increase in the areas subjected to cutting and road construction. Windthrow of trees in cut areas would result in a loss of 10 board feet per acre per year. This amount is of minor significance.

5.1.2 Air Quality

A decline of air quality due to particulate pollution would occur during the dry season (summer) in the vicinity of the logging activities and logging roads. A total of 173,640 acres of land would be subjected to some degree of occupancy by motor vehicles and other machinery. The operation of internal combustion engines directly related to the forest management practices of the proposed action would cause the following increases in pollution: nitrogen oxides, 141 tons per year; sulfur oxides, 4.7 tons per year; carbon monoxide, 513.2 tons per year; particulates, 8.44 tons per year. Since the increased pollution would disperse in unpopulated areas, these amounts are of minor significance.

Smoke pollution (a form of particulate pollution as the main effect) would impact the visual resource within an estimated 5-mile radius of each burning event. The impact would tend to be negligible since most burning would be done during periods of cloudy or rainy weather. In the worst case, a possible increase of 9.3 percent in particulate pollution would occur due to the slash burning (if all the smoke produced by the slash disposal were concentrated in the immediate air over the JSYU).

During herbicide applications a maximum of 20,000 gallons of diesel oil would enter the air as volatile aerosol over 10 years. Maximum amounts of herbicides drifting (to unknown distances) over the 10-year period equal: silvex (2,4,5-TP), 1,087.5 pounds; 2,4-D, 1,087.5 pounds; Roundup, 762.5 pounds; Krenite, 762.5 pounds; atrazine, 3,200 pounds; and dalapon, 3,300 pounds. These amounts would be of localized significance, especially if drift were to contaminate water bodies.

5.1.3 Soil

Nutrient losses from the soils of the areas subject to the silvicultural practices would equal 100 percent of the total values illustrated in Table 3-5, in the worst case situation. These losses would be of site specific significance; they would be minor compared to the whole of the JSYU.

Surface disturbance and compaction would equal 100 percent of the amounts given in Table 3-6.

Erosion amounts for the components of the proposal would approach 100 percent of the following amounts as a worst case:

Yarding and Loading	
Tractor Methods	2,835 tons over 4 years
Cable Methods	270 tons over 4 years
Transportation System	
New Road Construction	166,300 tons over 4 years
Reconstruction and Maintenance	7,500 tons over 10 years (3,000 tons/4 years)
Development and Protection Practices	
Scarification	28,125 tons over 4 years

These amounts would be of site specific significance to the whole of the JSYU.

Fertilization would cause an increase in the solubility of organic matter, and an increase in the growth of most plants in the entire forest ecosystem.

Planting would reduce soil erosion, increase retention of soil moisture and nutrients, and ameliorate the extremes of temperature and humidity.

The amount of all herbicides that would enter the soil of the JSYU over the 10-year period would be estimated as 100 percent of the highest values given in Table 3-7. The amount of diesel oil carrier that would enter the soil would be 83,400 gallons.

5.1.4 Water Resources

The worst case analysis of impacts to the water resources is based on what would occur as a consequence of the occurrence of a 100-year storm (an event with an annual expectancy of occurrence of 1 percent). Such a storm last occurred in December 1964, causing severe damage throughout Oregon and Washington. The effects of that storm were estimated to have increased the rate of sedimentation by over 22 times (Fredriksen 1972). Therefore, the worst case impacts to the JSYU would be 22 times the anticipated impacts for a normal water year, as presented in Chapter 3. The chance of such an event occurring during the 10-year period of the proposal would be one in ten.

The following impacts would occur on the lands subject to the proposal:

Proposal	Increase in Sediment Yield
Transportation System	30,702,780 tons
Yarding and Loading Practices	9,787,560
	40,490,340 tons
Compared to "normal" year	2,604,204 tons

(An increase of 15.5 times the anticipated increase due to the proposal in a "normal" year)

Increases of annual yield and other resource values would be site specific.

It should be remembered that the increases in sediment yield due to a 100-year storm would have devastating effects on all streams of the geographic region. Other values, such as roads, bridges, houses, and irrigation projects would receive similar impacts.

5.2 BIOLOGICAL ENVIRONMENT

5.2.1 Vegetation

Approximately 24 percent of the old-growth (200+ years) forest community would be removed from commercial forest land in the JSYU during the proposal period. Early seral stage communities would increase an estimated 275 percent over their present proportion. This impact represents a significant depletion of old-growth habitat as well as a significant increase in early seral habitat. Approximately 4,340 acres would be precluded from vegetation growth due to road construction. This is insignificant for the JSYU as a whole.

Following harvest, artificial reforestation with Douglas-fir, ponderosa pine, and sugar pine is proposed. Subsequent development practices designed to favor commercial coniferous species would reduce or inhibit species normally found in association with early seral stage conifers. This represents significant changes to existing community structure.

Timber management, therefore, could be viewed as an unavoidable adverse impact to vegetation because timber harvest alters the composition of the pre-disturbance forest community, and forest development practices alter the composition of the seral communities which naturally occur following forest disturbance. Development practices ultimately shorten the time required for the forest community to reestablish itself through seral modification of the physical site. The reestablished forest would be harvested before it could attain the community structure of the pre-logging old-growth community. Approximately 34,000 acres of mature and old-growth community would be unavoidably lost during the 10-year life of the action. If the proposed action were implemented into perpetuity all the old growth on the high intensity lands (except that amount indicated on Table 1-5) would be harvested within five decades. This impact is highly significant.

5.2.2 Animals

5.2.2.1 Terrestrial

The proposed action would alter habitat conditions through timber harvest on approximately 50,000 acres of high intensity lands in the JSYU. Most of this area is currently old-growth habitat. Although as much as 134,000 acres of old growth would remain on low intensity and limited management lands, the impact to wildlife dependent on old growth would be unavoidable and significant. Old growth, except for that shown in Table 1-5, which includes riparian buffer strips, would be eliminated on high intensity lands in approximately five decades if the proposed allowable cut level was continued that long. During the 10-year proposal life approximately 24 percent of the old-growth trees would be eliminated.

Assuming that old-growth habitat dependent species are currently at carrying capacity (a logical assumption when one considers the long time population has had to stabilize and the considerable habitat alteration that has already occurred), any reduction in area would have a significant adverse effect on dependent animal populations.

Development practices as proposed would maintain high intensity lands

in a predominantly Douglas-fir configuration and would discourage the development of other vegetation which provides forage and habitat for large and small animals. This could be significant during the period when it is necessary to control vegetation which competes with commercial coniferous species.

The 4,340 acres to be occupied by new roads would be unavailable for growth of wildlife forage. Roadside plantings of palatable forage species would partially mitigate the adverse impact, rendering net impact insignificant.

Snag removal, accomplished during timber harvest for safety reasons, would eliminate critical habitat for a variety of animal species. The removal of dying trees for insect or disease control precludes the development of succeeding snags to replace those trees which eventually decay and fall. This represents a significant impact on dependent wildlife species. This would be partially mitigated by snags left in the riparian buffer strips.

It is possible, but not probable, that an undetermined amount of TCDD (dioxin) bioaccumulation would occur in animals exposed to silvicultural applications of the herbicide silvex.

5.2.2.2 Aquatic

Fishes and aquatic invertebrates would be adversely impacted by stream bottom sedimentation and seasonal increase of suspended sediments due to logging, road construction or maintenance, and scarification. Worst case analysis discloses over 200,530 tons of soil erosion (Section 5.1.3). Should all this soil reach streams, an unlikely occurrence, the impact would be directly related to flow levels of affected streams. In the most likely case, peak erosion would coincide with peak stream flow and impact would be reduced by flushing. Nonetheless, the impact could be significant on fish habitat.

Herbicide application would introduce undetermined concentrations of toxic chemicals in the aquatic environment. It is doubtful, although possible, that levels of toxic chemicals so introduced could reach lethal levels for aquatic organisms.

Some evidence indicates that the contaminant of silvex (TCDD), may bioaccumulate in fish. However, the possibility of such accumulation under the conditions proposed for use would be extremely small. The time period that TCDD would remain in fish is unknown. Data on long-term impacts are not available.

Fertilization may increase nutrient enrichment of streams leading to increased algal growth. Increased biochemical oxygen demand of algae would decrease the amount of dissolved oxygen available for the sustenance of fishes. Impacts of fertilization on aquatic life would probably be insignificant.

5.3 SOCIAL ENVIRONMENT

5.3.1 Recreation

Recreation activities oriented toward appreciation of natural beauty and solitude would be unavoidably impacted by timber management actions, at least temporarily, in any specific location subject to such actions.

5.3.2 Cultural Resources

Some historical and archeological values would be unavoidably impacted since it is impossible to locate all such sites in the dense vegetation of the JSYU. Level of significance would depend on the scientific value of each site.

5.3.3 Visual Resources

Change would occur in the present landscape. All timber management treatments introduce contrasts from the existing visual mosaic resulting in unavoidable short-term adverse impacts. Smoke from slash burning would create a seasonal impact on visibility.

5.3.4 Noise

Noise associated with proposed actions would create adverse impacts to those who are in the forest seeking solitude.

5.3.5 Human Health

Effects of dioxin on human health are under investigation by EPA. Adverse impacts, if any, on the physical health of area residents are unknown. Any use of silvex is expected to have some adverse impacts on the emotional health of some area residents due to their concerns over its presence in their environment.

5.3.6 Socioeconomic

Compared to the timber-based employment projected for 1980, an employment reduction of approximately 450 local and 50 non-local jobs (direct and indirect) would be expected to follow the proposed lower harvest level (approximately 380 jobs lower if compared with 1973-75 levels). The decrease in aggregate personal income of resident workers and proprietors is projected to be 2.3 to 4.4 percent in Josephine County, and less than 1.5 percent in Jackson and Douglas Counties. Induced emigration from the three counties might be as much as 1,300 persons but probably would be markedly less. The adverse residual socioeconomic impacts judged to be significant are primarily the impacts on individuals and households resulting from the trauma of added uncertainty regarding employment and income stability, and of adapting to employment losses.

Effects of the proposed action on employment stability and social stability are judged to be significant even though recent variations in harvest in Josephine County exceed those expected to result from the proposed action. This judgment is based upon indications of existing employment and social instability manifested in high (compared to Oregon) incidence of poverty, divorce, unemployment, and low per capita income. Contrary indicators are low crime rates. On most measures of socioeconomic conditions, Josephine County was abnormal.

Annual public revenue for all O&C counties would be expected to decline about $3.3 million below that projected (based on current management) for 1980, based on recent stumpage prices. Josephine County would receive approximately $400,000 less than projected under current management. In view of the trend in timber stumpage prices, however, a

decline in O&C payments below recent levels is not expected.

5.4 LAND USE

5.4.1 Wilderness

Any unwithdrawn lands with primitive and/or wilderness characteristics that occur on O&C lands capable of sustained yield management would be severely impacted since they would be precluded from study as a wilderness area.

6. THE RELATIONSHIP BETWEEN LOCAL SHORT-TERM USES OF MAN'S ENVIRONMENT AND THE MAINTENANCE AND ENHANCEMENT OF LONG-TERM PRODUCTIVITY.

This chapter is intended to summarize the trade-offs between the short-term uses entailed in the proposed action and the long-term resource-use and environmental effects of the proposal. The short term discussed is 10 years, the term of the proposed allowable cut plan. The long term is the time after all coniferous trees now standing on the high-intensity lands designated for inclusion in the harvest plan would be cut--approximately 80 years and longer.

The short-term use of the high intensity lands for timber harvest would increase the long-term production of wood fibers, as old, slow-growing or stagnant stands are replaced by young, thrifty stands managed for optimum wood production. In the long term, as the area approaches a balance of age classes, there is a potential for increasing the allowable harvest. The trial harvest on low-intensity lands may lead to similar results.

In the long term, the harvest of old-growth timber on these lands would encourage the expansion of earlier successional stages of habitat. Some non-timber plant species and specific animal species dependent on old-growth community conditions would be eliminated in these areas. The habitat changes, on the other hand, would enhance the potential for deer and elk and provide for a greater diversity of small mammals and birds on these areas. The removal of many snags and dead trees in the course of harvesting timber would reduce habitat for cavity users.

Most forested lands in the Rogue and South Umpqua River drainages are in private ownership from which the old-growth timber has been harvested. Of the old-growth stands remaining on Federal lands a substantial portion is designated for harvest but some 300,000 acres of old growth have been excluded from timber harvesting, both in designated wilderness areas and for other reasons. Old-growth reserves within the JSYU are shown in Tables 1-4 and 1-5. These lands provide a long-term reserve of old-growth wildlife habitat, and are likely to be supplemented by further designations of wilderness areas on Federal lands and by other Federal exclusions from timber harvest plans.

The loss of old-growth timber from these areas would also eliminate an esthetic resource, particularly for direct contact viewers. However, the resultant variation in visual features in the emergent managed forest would have esthetic appeal of a different kind; in some cases visual features would be enhanced for the foreground or background viewer.

Access would be increased for recreation users such as hunters and berry pickers. A consequent increase in dispersed activity visitor use is expected to occur. The more managed environment would be less attractive to, and is expected to diminish visitation by, recreationists who seek the beauty and solitude of the natural forest, with consequent increase in visitation to remaining unmanaged forest areas in the region.

Logging activities would inevitably cause some erosion and compaction

of soil. The resultant long-term loss in soil productivity would be partially compensated by fertilization. Loss of soil and sedimentation due to erosion would be minimized by project design features and would revert to natural levels on each affected site within the short term. Sediment accumulation in streams, however, would have adverse affects on aquatic habitat, which would continue over the long term. Although collective timber harvest activity on all lands in the Rogue and South Umpqua River drainages would be at a lower level for many years to come than in the recent decade, combined sediment accumulation in streams from all sources would damage aquatic habitat in some stream reaches.

The use of 4,340 acres for new timber management roads would remove that land from vegetative production and wildlife habitat for the long term.

Annual slash burning would have at least localized adverse impact on air quality and visibility during burning periods. Slash burning on other lands would sometimes compound this effect, but not cause it to be further dispersed.

Intensive timber management practices such as herbicide application would favor survival of coniferous trees and discriminate against hardwood trees, shrubs, grasses, and herbs. Application of herbicides and fertilizers would increase wood fiber production in the long term and provide for higher rates of harvest in the short and long term. As a result of the use of the herbicide silvex, TCDD bioaccumulation in some organisms may occur, with undetermined effects which could extend over the long term. Effects may apply to humans, as indicated by the EPA committee judgement that an adequate margin of safety does not exist for women of child-bearing age exposed to cumulative effects of dermal, oral, and inhalation exposure of 2,4,5-T and TCDD. Herbicide application on nearby lands managed for intensive timber production by others would extend the area in which contact could occur and might add to any bioaccumulation in individual organisms.

The long-term cumulative effect of all the treatments as displayed in Table 1-1 (i.e., the proposed action) is a managed forest which would produce timber on sustained yield basis. Other values of the present old-growth acreage on high-intensity timber management lands would be foregone except on those lands (Table 1-5) specifically excluded from the treatments.

7. IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

This chapter identifies the extent to which the proposed action would irreversibly limit the potential uses of the land and resources. The term irreversible means incapable of being returned to its original state. Irretrievable means a resource or value cannot be replaced.

7.1 PHYSICAL ENVIRONMENT

While slash burning would not be anticipated to significantly lower the air quality of the JSYU, there is a possibility that particulate pollution would increase by 9.3 percent.

The maximum amount of soil that would be irretrievably lost due to the proposal would be 200,530 tons over the 10 years.

An unknown decline in the water quality of some streams would occur due to contamination by sedimentation, debris slides, nutrient losses from soil on logged areas, and application of chemicals.

7.2 BIOLOGICAL ENVIRONMENT

Approximately 55,000 acres of commercial forest would be converted to early seral stage communities. Approximately 27,000 acres of old-growth Douglas-fir community would be irretrievably lost due to logging operations. Some unidentified endangered plant species could be lost, directly through logging, road construction or herbicide application or indirectly as a result of habitat changes. Permanent road construction would eliminate vegetation from 4,340 acres. Some irreversible loss of vegetative productivity would occur on approximately 12,000 acres of land subjected to soil compaction.

Most of the wildlife species dependent on the old-growth habitat that is removed would probably be eliminated, as the surrounding suitable habitat is probably already at carrying capacity.

Under the terms of the spotted owl management plan, BLM is providing sanctuary for 90 pair of owls throughout the state. Six of those 90 have been assigned to the JSYU. Additional owls are known to occur in the planning area.

7.3 SOCIAL ENVIRONMENT

There would be irretrievable loss of solitude, serenity, or isolation due to timber management activities. Some timber management activities would result in the loss of opportunities for the pursuit of recreational activities.

Damage or destruction of any archeological site would be irreversible and irretrievable. Knowledge lost as a result would be permanent.

The alteration of historical sites would result in the irretrievable loss or lessening of their original intrinsic value to society. The potential of the undisturbed sites and their settings to provide interpretive, educational, recreational, and esthetic opportunities would decrease irretrievably.

The proposed action would commit public funds which would be returned in the form of timber yield over many decades. The resources would be

irreversibly committed in expectation of increased growth rates of timber. These expectations are the basis for approximately one-third of the annual harvest in the proposed plan. It is concluded that the energy investment of the proposal (1.308 trillion Btu's) constitutes an impact on dwindling world supplies of petroleum-derived energy which is irretrievable. The relative magnitude of the adverse impact is unknown.

Based on present operating costs, implementation of the proposal is expected to require approximately $3,000,000 per year. This includes planning, layout and administration of timber sales; planning, contract cost and administration of forest development projects; provision for seedling planting stock; and the tree development program.

7.4 LAND USE

Land invested in roadways, both existing and proposed, is irreversibly lost. Restoration techniques applicable in gentle topography are not effective or practical in the steep terrain of the JSYU.

Wilderness values lost as a result of the proposed action would be an irretrievable commitment.

8. ALTERNATIVES

Seven alternatives to the proposed action will be described and analyzed in this chapter. Each alternative discussed relates to a level of timber harvest since timber production is a major goal for the management of forest lands in the JSYU as specified by the O&C Act. However, several alternatives include harvest schedules not permissible under present law, regulation or policy. They are included to provide the decision makers with a variety of choices.

Since all alternatives are for levels of timber harvest, mitigation measures are the same as those included in the proposal as project design features (Section 1.6) or provided in Chapter 4. Adverse impacts which cannot be avoided, therefore, correspond to those identified in Chapter 5 for the proposal, varying only in relation to the harvest level analysis for each alternative.

The seven alternatives are:

1. No control of competing vegetation.

2. Control of competing vegetation with all approved herbicides except silvex.

3. Limited investment in timber production.

4. Utilization of surplus inventory.

5. Forestry Program for Oregon

6. Zane Grey Wilderness study area.

7. No action.

These alternatives are not the only alternatives to the proposed action but represent a cross section of possible options. Land-use allocation options were considered in the Management Framework Planning process and are discussed in Section 1.8.1. The 1.76 million cubic feet from trial harvest on low intensity lands is an intact feature of any of the timber harvest alternatives except no action.

Table 8-1 compares the treatments involved in the proposal with the extent of treatments in certain alternatives.

Impacts of selective alternatives compared with the proposed action are summarized in Table 8-6. Table 8-7 compares all of the alternatives with the proposed action in relation to statewide goals of the Oregon Land Conservation and Development Commission (LCDC).

8.1 NO CONTROL OF COMPETING VEGETATION ALTERNATIVE NO. 1

This alternative is identical to the proposed action except that no attempt would be made to control grass, brush, or hardwood species growing in competition with commercial coniferous tree species. This would eliminate treatments for the control of competing vegetation both prior to reforestation (site preparation) and after young stands become established (stand release).

Table 8-1

Comparison of Treatments for Ten-Year Period -- Proposed Action and Alternatives

	Proposal		Alternatives						
	High Intensity Lands	Low Intensity Lands	(1) No control of Competing Vegetation	(2) Vegetation Control Without Silvex	(3) Limited Investment	(4) Utilization of Surplus Inventory	(5) Forestry Program for Oregon	(6) Zane Grey Wilderness	(7) No Action
Harvest in First Decade									
Million cubic feet	18.34	1.76	14.34 1/	20.10 1/	16.85 1/	21.17 1/,2/	24.63 1/,2/	19.45 1/	28.63 3/
(Million board feet Scribner	(94)	(9)	(73)	(103)	(86)	(108)	(126)	(99)	(146)
Treatment - acres involved									
Transportation System									
Construct 500 miles of permanent road	3,940	400	4,340	4,340	4,340	4,340	4,340	4,340	4,340
Reconstruct 100 miles of existing road	0	0	0	0	0	0	0	0	0
Surface 50 miles of existing road	0	0	0	0	0	0	0	0	0
Shelterwood Harvest									
Regeneration Cut	36,000	5,000	29,500	41,000	36,000	43,200	49,000	39,700	47,200
Final Harvest Cut	9,000	0	6,100	9,000	7,700	9,500	10,800	8,700	11,800
Clearcut	5,000	none	3,400	5,000	4,300	5,300	6,000	4,800	6,600
Slash Disposal									
Burning	10.000	100	6,900	10,100	8,700	10,700	12,100	9,800	0
Gross yarding (including machine piling)	30,000	3,500	23,900	33,500	29,300	35,300	40,000	29,000	300
Site Preparation									
Herbicide	33,500	1,000	0	34,500	29,800	36,500	41,200	33,400	0
Mechanical Scarification	160	0	160	160	160	160	160	160	0
Planting									
Replant or Interplant (backlog)	9,200	0	9,200	9,200	9,200	9,200	9,200	9,200	9,200
Initial Planting	41,000	0	27,900	41,000	35,300	43,500	49,000	39,700	10,000
Replant & Interplant (new cutting areas)	12,300	0	8,400	12,300	10,600	13,000	14,700	11,900	2,200
Herbicide Release	13,200	0	0	13,200	0	14,000	15,800	12,800	0
Precommercial Thinning	14,200	0	2,300	14,200	0	14,200	14,200	14,200	0
Fertilization	18,900	0	12,800	18,900	0	20,000	22,600	18,300	0
Commercial Thinning	4,700	0	4,700	4,700	0	4,700	4,700	4,700	0

1/ Harvest computed for allowable cut base (222,058 acres) to which is added trial harvest from low intensity lands at same rate as the proposal.
2/ Rate of harvest different for subsequent decades, see narrative for this alternative.
3/ Harvest computed for allowable cut base of existing declaration (334,500 acres). See Section 1.9 for assunmptions employed.

On high intensity lands the sustainable allowable cut expected to result from this option is 12.58 MM cu. ft. (64 MM bd. ft.), as shown in Figure 8-1, compared to 18.34 MM cu. ft. (94 MM bd. ft.) for the proposed action. With the additional 1.76 MM cu. ft. (9 MM bd. ft.) harvested on low intensity lands, the total planned harvest for Alternative No. 1 would be 14.34 MM cu. ft. (73 MM bd. ft.).

8.1.1 Climate

Areas subjected to the silvicultural practices and construction activities would experience extremes in both daily and annual temperatures. Variation in daily surface temperatures would go from an average of 15 to 20 degrees to as much as 70 degrees or more within 2 inches of the soil surface. Annual variations would increase by as much as 25 degrees, due to exposure to direct sunlight in summer, and radiation cooling and cold air drainage in winter.

Increased exposure to wind and convective air movement would cause more evaporation of existing moisture; greater variation in humidity would result. Relative humidities in the areas subject to logging would have increases from present ranges of 45 to 95 percent of saturation to

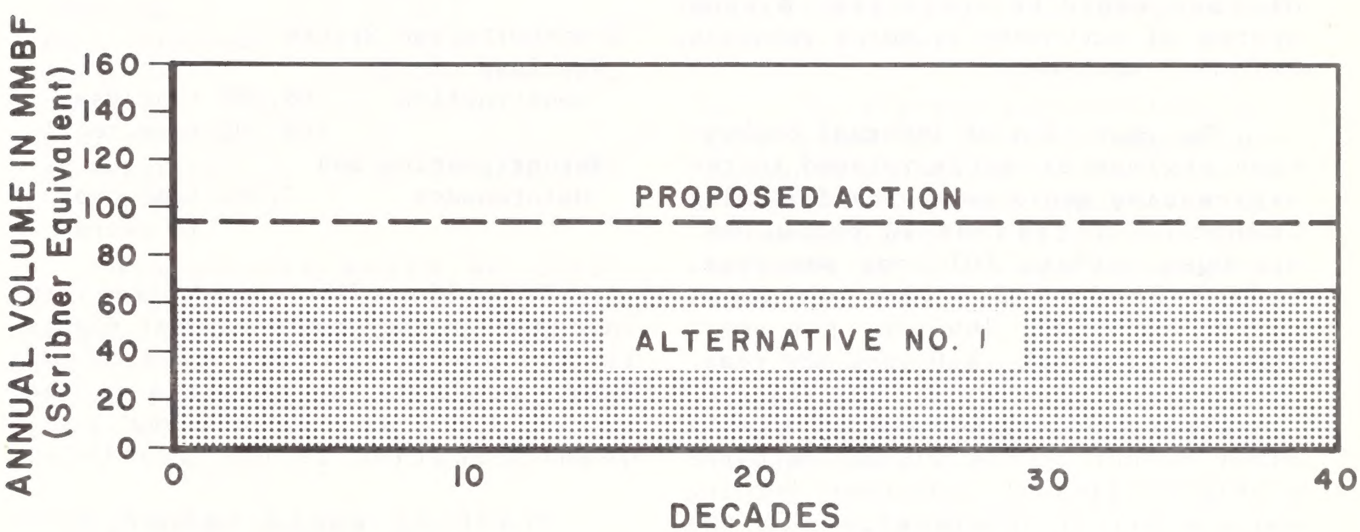


Figure 8-1 COMPARISON OF PROPOSED ANNUAL ALLOWABLE CUT WITH ANNUAL ALLOWABLE CUT USING ALTERNATIVE NUMBER 1

SOURCE: BLM Forest Inventory • 1976

ambient ranges of 20 to 95 percent saturation. Summer drought conditions would prevail in areas previously protected by forest vegetation to the extent of 73 percent of the areas considered under the proposed action.

Air movement would increase in the areas subjected to cutting and road construction. Windthrow of trees on margins of cut areas and within areas having received regeneration cut would result in a loss of 7.1 board feet per acre per year.

8.1.2 Air Quality

An increase in particulate pollution would occur during the summer near the logging activities and roads. A total of 78,900 acres of land would be subjected to some degree of occupancy by motor vehicles and other machinery.

The operation of internal combustion engines directly related to the alternative would cause the following amount of increases in pollution: nitrogen oxides, 101 tons per year; sulfur oxides, 3.4 tons per year; carbon monoxide, 366 tons per year; and particulates, 6.0 tons per year.

Smoke pollution would have a minor effect on the visual resource within 5 miles of individual burning events (slash disposal). In the worst case, a possible 2.9 percent decrease in total particulate pollution would occur due to slash disposal directly related to this alternative.

8.1.3 Soils

Nutrient losses from the soils of the areas subjected to the silvicultural practices would be estimated to approach the following totals over 10 years:

Nitrogen:	92,171 lbs.
Phosphorus:	27,507 lbs.
Potassium:	47,182 lbs.
Calcium & Magnesium:	178,133 lbs.

Surface disturbance would occur on an estimated 14,010 acres (in the worst case); compaction would occur on 8,835 acres (estimated, in the worst case).

The total amount of erosion for the components of the alternative are estimated as follows:

Yarding and Loading	
Tractor methods	810 tons/year
	2,023 tons total
Cable methods	77 tons/year
	193 tons total
Transportation System	
New Road Construction	66,500 tons/year
	166,300 tons total
Reconstruction and Maintenance	7,500 tons over 10 years

Fertilization would cause an increase in the growth of most plants in the entire forest ecosystem. There would be an increase in the solubility of organic matter. Quantification is not possible.

Planting would reduce soil erosion, increase retention of soil moisture and nutrients, and ameliorate extremes of temperature and humidity.

8.1.4 Water Resources

8.1.4.1 Water Yield

There would be an increase in the water yield from the JSYU the first year of the following estimated amounts:

Silvicultural Practices:

Shelterwood Harvest	17,836	acre feet
Clearcut	4,280	
Commercial Thinning	2,350	
Total	24,466	acre feet

Yarding and Loading Practices:

Cable Methods	914	acre feet
Tractor Methods	4,796	
Slash Disposal	214	
Total	5,924	acre feet

Transportation System:

New Roads	8,680	acre feet
Reconstruction	868	
Surfacing	260	
Total	9,808	acre feet

Development Practices:

Mechanical Scarification	16	acre feet
Planting	-7,813	
Fertilization	- 472	
Total	-8,269	acre feet

Total for the Alternative:	31,929	acre feet

This amount would be equal to 0.7 percent of the annual discharge of the Rogue River at Agness, Oregon, in water year 1975. This amount is of slight significance to the JSYU.

8.1.4.2 Water Quality

Sediment yield would increase by the following estimated amounts over the average of water year 1975:

Yarding and Load Practices:

Cable Methods	44,233	tons
Tractor Methods	105,080	
Slash Disposal	16,052	
Total	165,365	tons

Transportation System:

New Roads	440,781	tons
Reconstruction	44,756	
Surfacing	30,516	
Total	516,050	tons

Total for the Alternative:	681,415	tons

This compares to an increased yield of 747,839 tons for these practices under the proposed action, and 837,062 tons for the present allowable cut. This would be a significant reduction.

8.1.5 Vegetation

Timber management without control of competing vegetation would produce a spectrum of vegetation impacts differing from the proposed action as follows:

a. Thirty-two percent less old growth and 33 percent less mature communities would be destroyed on commercial forest lands over the 10-year life of the alternative because the allowable cut would be less.

b. Seral truncation would be less pronounced. Early seral communities could achieve greater development and species diversity.

c. Ground disturbance would be less because fewer acres would be subjected to logging and forest development practices. Approximately 43 percent less alteration of plant habitat or direct injury to plants would occur.

d. The production of commercial wood fiber would be lower because commercial species would not be released from competition with brushy species, grasses and herbs.

This lower rate of commercial wood fiber production is reflected in the lower sustained allowable cut level.

e. Approximately 28 percent fewer trees would require cutting during the first decade.

8.1.6 Animals

Timber management without control of competing vegetation would produce a spectrum of impacts to wildlife identical to those enumerated for the proposed action except that:

a. About 32 percent less mature and old-growth habitat would be destroyed on high intensity lands over the 10-year life of the timber management plan because the annual allowable cut would be lower. Ultimate elimination of these habitats from commercial forest lands would occur within seven decades if the plan were implemented into perpetuity as compared with five decades for the proposed action.

b. Truncation of early seral habitats would not be as pronounced if no controls were applied.

The net impacts to wildlife with this alternative as compared with the proposed action would be a lessened adverse impact on old-growth dependent species and a potentially beneficial impact to wildlife which depend on early seral stages. Although all the old growth and most of the snag habitat would eventually be removed in either case if either management plan were carried into perpetuity, the ultimate elimination of habitat would occur approximately seven decades in the future for Alternative No. 1 as compared with five decades for the proposed action. Therefore, old growth and snag habitat would be available for dependent species for a longer period of time with this alternative than with the proposed action.

The proposed action seeks to obtain the early dominance of a cutover site by Douglas-fir and to reduce competition between Douglas-fir and non-commercial plant species by the use of development practices such as herbicide application and fertilization. Exclusion of the use of herbicides as in this alternative would allow all species of plants to attain their normal degree of development and, therefore, their maximum potential benefit to dependent wildlife. Elimination of herbicides would also prevent potential impacts to aquatic habitat caused by herbicide runoff or overspray. In addition, the exclusion of herbicides would eliminate the threats of toxic TCDD exposure or bioaccumulation in organisms.

Absence of control of competing vegetation, by virtue of the associated effect on allowable cut level, would reduce the amount of ground disturbance and therefore reduce the gross amount of sediment which would enter the aquatic environment. Full development of seral communities would also provide additional erosion control so that stream sedimentation would be further reduced. Therefore, the adverse effects of sedimentation on fishes would be reduced over what they would be with the proposed action. Adverse impacts, however, would not be entirely eliminated.

8.1.7 Recreation

Impacts to recreation associated with this alternative differ from

those of the proposal primarily due to the elimination of herbicides as a technique for controlling competing vegetation. There would be no herbicide-associated damages to the health of recreationists. Any effect herbicides usage has on water quality would be eliminated, thus removing risks in water contact recreation.

The danger of herbicide-related water pollution affecting fish and fishing success would be nonexistent. A slight increase in visitor-days associated with fishing use would be anticipated (see Table 8-6).

Hiking and sightseeing would be more difficult, due to decreased visibility along roads and in the forest without vegetative control. The quality of hiking and sightseeing experiences would decrease. A slight decrease in visitor-days associated with general sightseeing and miscellaneous use would result (see Table 8-6).

Helicopter usage, with associated impact on the quality of recreational experience, would be reduced.

The alteration of small, undeveloped pristine areas would total about 19,500 acres (compared to 27,500 acres under the proposed action).

8.1.8 Cultural Resources

Impacts as a result of implementing this alternative would include all of those delineated as a result of the proposed action.

8.1.9 Visual Resources

Impacts would be the same as those of the proposed action except:

a. Some possibilities to openly view attractive or interesting features, which had been previously screened, may be lost.

b. This alternative would eliminate the possibility of esthetically desirable shrub species being eliminated.

c. The adoption of this alternative would result in 47,700 acres being maintained in a more nearly natural ecological state. By virtue of these areas being less disturbed, they would have more visual variety. For example, a mixed stand of hardwood and Douglas-fir would be more attractive, with more fall color.

d. In some cases, visual variety would decrease when desired vegetative configurations cannot be developed.

8.1.10 Noise

Impacts would be the same as those of the proposed action except that the noise of helicopters or motorized pressure systems used in the application of herbicides would be eliminated.

8.1.11 Human Health

As no herbicides would be used for timber management, no adverse impacts from TCDD would occur.

8.1.12 Socioeconomic Conditions

Economic analysis of each alternative is based on estimates of timber sales and associated employment, personal income and public revenue.

Population impacts will follow the same patterns as timber harvest and employment, as displayed in Chapter 3. Each alternative will be compared with the situation that would exist under the proposed action.

The section regarding socioeconomic impacts presents both short-term and long-term equilibrium. It is important to recognize that socioeconomic impacts are dependent upon levels of timber harvests, and that for "non-equilibrium" levels of harvest during the first decade (i.e., those analyzed as Alternatives 4, 5, and 7), long-term production of timber is diminished. Long-term and short-term should both be reviewed because they have very different impacts.

The socioeconomic impacts addressed in Table 8-6 are based on the first decade. Comparisons to the existing situation for the socioeconomic variables are based on the historical situation during the 1973-75 period. A guide to interpretation of the economic variables, and to parameters used in estimating economic impacts is provided in the Chapter 3, Section 3.3.6.

Table 8-2 presents comparisons of each alternative with the proposed action based on the premise that sustained yield is at a long-term equilibrium. Long-term equilibrium is achieved at that point in each alternative when the graph of yield becomes level and extends into perpetuity. It reflects the situation in which planned harvest is expected to neither increase nor decline. It is the maximum level of harvest that can be perpetually sustained, given the forest development practices and pre- "long run equilibrium" harvest practices associated with the alternative.

To maintain validity of comparisons, all variables, e.g., stumpage price and labor/output ratios not within control of the timber management, are assumed to be the same among alternatives. The time period assumed in selection of the projected parameters is 1990. It is projected that economic effects of the altered harvest (first decade) will be realized within 3-5 years after adoption of a plan. The dependent economy would reach this state, at the earliest, during 1982-84.

Parameters used in preparation of the analysis presented in Table 8-3 were projected for 1980, because much of the data prepared by other entities, and used in the analysis, is projected to decennial years. 1980 is the nearest such period to full implementation of the proposal or alternative harvest levels. This imperfect fit will not damage use of Table 8-3 for comparison, however. It leads to overstatement of the size of employment differences and understatement of differences in O&C payments, but the directions of change and relative magnitude of difference among alternatives will remain the same.

Both Table 8-2 and 8-3 are presented at this point to allow reference and more comprehensive understanding as the reader progresses through the economic analysis of each alternative.

In the narrative discussion of relative economic impacts, the base region is the Medford Timbershed as defined in Beuter et al. 1976. In contrast, the tabular presentation in Tables 8-2 and 8-3 compares the economic effect of sales from the entire JSYU, with "totals" for Josephine County only. Timber output

Table 8-2

Long-Term Equilibrium Differences in Effect of Timber Management in the JSYU upon Economic Variables, Alternatives 1, and 3-7, Compared to the Proposal[1/]

Economic Variable[2/]	Units	Proposed Action (1990)	Difference of Proposal from Alternative Number: 1	3	4	5	6	7	Difference from Current Management (1973-4-5)
Timber Supply									
Annual BLM Timber Sales (JSYU)	(MMBF)	94	-30	-17	0	-42	-4	-7	32
All sources (Timbershed)	(MMBF)	562	-22	-13	0	-31	-3	-5	-7
Employment (Direct)									
Timber	(Jobs)	541	-173	-98	0	-242	-24	-40	344
Forest Development	(Jobs)	42	-10	-10	2	6	0	-35	38
Total	(Jobs)	583	-181	-108	2	-236	-24	-75	306
Non-Local	(Jobs)	54	-17	-10	0	-24	-2	-4	47
Employment (Direct & Indirect)									
Josephine Co.	(Jobs)	658	-200	-125	4	-244	-25	-113	289
Percent Total for Josephine Co.	(Percent)	3.1%	-0.9%	-0.5%	0%	-1.2%	-0.1%	-0.5%	3.1%
Total Local	(Jobs)	1059	-329	-196	4	-429	-44	-136	556
All Jobs (local & non-Local)	(Jobs)	1157	-360	-215	4	-472	-47	-144	640
Local Personal Income (1974 data)	($1,000,000)	20.7	-6.5	-3.8	0.1	-9.2	-0.9	-2.0	6.1
Public Finance (O&C Payments									
JSYU Dependent O&C Payments									
O&C Area	($1,000,000)	9.6	-3.1	-1.7	0	-4.3	-0.4	-0.7	4.7
S.W. Oregon	"	6.0	-1.9	-1.1	0	-2.7	-0.3	-0.5	-3.0
Josephine Co. Area	"	1.2	-0.4	-0.3	0	-0.5	-0.0	0.1	-0.6
Douglas Co. Area	"	2.4	-0.8	-0.4	0	-1.1	-0.1	-0.2	-1.2
Tax Rate Equivalence of O&C Payment									
O&C Area	($/$1,000 T.C.V.)	0.27	-0.08	-0.05	0	-0.12	-0.01	-0.02	-0.07
S.W. Oregon	"	1.09	-0.35	-0.20	0	-0.49	-0.05	-0.08	-0.31
Josephine Co. Area	"	1.65	-0.53	-0.30	0	-0.74	-0.07	-0.12	-0.40
Douglas Co. Area	"	1.31	-0.42	-0.24	0	-0.59	-0.06	-0.10	-0.41

1/ Alternative 2 is not displayed because it has the same effect as Alternative 1. Long-term equilibrium levels are achieved as follows: during decade two for the proposal and Alternatives 1, 2, 3 and 4: decade five for Alternative 5 and decade nine for Alternative 7. Unless otherwise noted, harvest from all sources and all projected economic parameters are based on decade two, centered on the year 1990.

2/ Consult the Chapter 3 introduction to Section 3.3.6 for an interpretation of the Economic Variables and key parameters used.

Table 8-3

Short-term (first decade), Differences in Impact of Timber Management in the JSYU upon Economic Variables, Alternatives 1 and 3-7, Compared to the Proposal 1/, 2/

Economic Variable 3/	Units	Proposed Action	Difference of Proposal from Alternative Number: 1	3	4	5	6	7	Difference from Current Management (1973-4-5)
Timber Supply									
Annual BLM Timber Sales (JSYU)	(MMBF)	103	-30	-17	5	20	-4	40	23
All sources (Timbershed)	(MMBF)	578	-22	-12	3	18	-3	29	NA
Employment (Direct)									
Timber	(Jobs)	675	-197	-112	32	131	-26	262	210
Forest Development	(Jobs)	42	-8	-10	2	6	-0	-35	-38
Total	(Jobs)	717	-205	-122	34	137	-26	227	172
Non-Local	(Jobs)	65	-19	-11	3	13	-3	26	36
Employment (Direct & Indirect)									
Josephine Co.	(Jobs)	800	-225	-139	38	143	-28	208	142
Percent Total for Josephine Co.	(Percent)	4.4%	-2.5%	-0.8%	0.3%	0.8%	-0.1%	1.2%	1.8%
Total Local	(Jobs)	1,303	-373	222	61	242	-51	412	312
All Jobs (local & non-Local)	(Jobs)	1,421	-407	242	67	265	-56	459	378
Local Personal Income (1974 data)	($1,000,000)	22.7	-6.6	-3.9	1.0	4.4	-0.9	7.8	5.0
Public Finance (O&C Payments)									
JSYU Dependent O&C Payments									
O&C Area	($1,000,000)	7.9	-2.3	-1.3	0.3	1.5	-0.3	3.0	-3.0
S.W. Oregon	"	4.9	-1.5	-0.8	0.2	1.0	-0.2	1.9	-1.9
Josephine Co. Area	"	1.0	-0.3	-0.2	0.0	0.2	-0.0	0.4	-0.4
Douglas Co. Area	"	2.0	-0.5	-0.3	0.1	0.4	-0.1	0.8	-0.8
Tax Rate Equivalence of O&C Payment									
O&C Area	($/$1,000 TCV)	0.22	-0.06	-0.04	0.01	0.04	-0.01	0.09	-0.02
S.W. Oregon	"	0.89	-0.26	-0.15	0.04	0.18	-0.04	0.07	-0.11
Josephine Co. Area	"	1.43	-0.42	-0.25	0.08	0.27	-0.05	0.50	-0.18
Douglas Co. Area	"	1.11	-0.31	-0.19	0.06	0.21	-0.04	0.42	-0.21

1/ Since Alternative 2 has the same effect as Alternative 1, it is not displayed.
2/ Unless otherwise noted, economic impacts of the proposal and alternatives are based upon econmic parameters projected to 1980 levels.
3/ Consult the introduction to Section 3.3.6 for an interpretation of the Economic Variables and key parameters used.

and associated employment projections are based upon the JSYU. All estimates of employees per unit volume are based upon the projected 1975-85 situation from Appendix K. Projections in Appendix K are pro-rated to represent only those portions of the JSYU contained in Beuter's Medford Timbershed.

8.1.12.1 Impacts on Timber Sales

Annual timber sales in Alternative No. 1 would be 30 MM bd.ft. below that of the proposed action. This reduction would represent 5.2 percent of harvest projected for the Medford Timbershed under the proposed action, 4.9 percent when compared to the no action alternative (No. 7).

8.1.12.2 Impacts on Employment and Personal Income

Direct local employment dependent on harvest and forest development practices during the first decade would be 205 local jobs fewer than for the proposed action, and 19 jobs less in pulp and paper processing elsewhere in Oregon. For the long-term equilibrium, comparable impacts would be 173 local jobs fewer than for the proposed action.

Total Josephine County jobs lost (225) as compared to those attributable to the proposal would represent 2.5 percent of total employment in Josephine County during the first decade: in the long term the same measure would decrease 200 and represent 0.9 percent of total Josephine County employment during that period.

During the first decade, and compared to that of the proposed action, community personal income would decrease by 6.6 million dollars, 0.9 percent of total personal earnings in Josephine, Jackson, and Douglas Counties during 1974.

8.1.12.3 Impacts on Local Public Finance

During the first decade, annual O&C payment to all counties compared to the proposed action would decrease by 2.3 million dollars, which would represent $0.06 in property tax rate equivalence (per thousand dollars true cash value (TCV) based on 1977 assessed valuation). For southwest Oregon counties, O&C payments attributable to the JSYU would decrease by $1.5 million. For Josephine and Douglas County the O&C payment and property tax rate equivalence would fall by: $0.3 million and $0.42; and $0.5 million and $0.31, respectively.

8.1.13 Energy

Total energy consumption attributable to this alternative would be approximately 0.947 trillion Btu's. While energy utilization for roads is the same as the proposal, log production would be reduced and use of herbicides eliminated. Energy use would be 73 percent of that associated with the proposed action.

8.1.14 Land Use

Impacts to land use including wilderness would be the same as in the proposed action.

8.2 CONTROL OF COMPETING VEGETATION WITH ALL APROVED HERBICIDES EXCEPT SILVEX
ALTERNATIVE NO. 2

This alternative would yield the same annual harvest as the proposed

(20.10 million cubic feet). It differs from the proposal in that silvex would be precluded as a herbicide for use in the control of competing vegetation.

As shown in Table 1-9, the proposed action would utilize silvex, either alone or in combination with other chemicals, on an estimated 29,000 acres during the decade. Appendix B, an example herbicide plan for the JSYU, indicates 8,728 acres would have received silvex treatment in 1978, had spraying been authorized.

While it would seem that Table 1-9 underestimates decadal silvex usage, projected 1979 herbicide plans for western Oregon show a 50 percent reducation in silvex acreage (files in Oregon State Office, BLM). It is assumed that this trend, due to increased usage of herbicides recently registered for forestry use in Oregon, is applicable to the JSYU.

Table 8-4 summarizes potential replacements for silvex, indicating target species and anticipated effectiveness. All herbicides listed, except picloram, have been described in Section 1.6.4.1. Picloram (trade name, Tordon) is a non-selective herbicide used for site preparation, thinning of conifers, control of noxious or poisonous plants, and maintenance of improvements. It is one of the least toxic herbicides to animals, however it is very toxic to plants. It is used for the control of unwanted trees by injection, application to the surface of stumps of sprouting species or by spreading pellets over the ground above the root system. It is also used for road maintenance and planting site preparation. Application rates range from 1 to 3 pounds per acre.

Of the 20 herbicide treatments listed in Appendix B for use in the JSYU during the illustrative year, 1978, 13 would have employed silvex. Table 8-5 shows replacements which could be used under this alternative.

Table 8-4
Potential Substitutes for Silvex

Target	2,4-D	Krenite	Roundup	Picloram
Vine Maple		Fair-site prep Poor-release	Good-site prep Fair-release	Very good-site prep only
Bigleaf Maple	--	--	--	Good-by injection only
Snowbrush	Fairly good	--	--	--
Varnishleaf	Fairly good	--	--	--
Golden Chinkapin	--	--	--	Fairly good-by injection only
California Hazel	Poor-unless combined with Dicamba for site prep	Fair-site prep Poor-release	Good	Good-site prep only
Poison Oak	--	--	Unknown	Good-site prep only

-- means "no or little effect"

Table 8-5

Silvex Replacements

Treatment Number	Target	Purpose	Original Mix	Substitute
14	Madrone, Manzanita, Alder, Hazel	Release	2,4-D, Silvex	Use 2,4-D in diesel. If hazel a problem use Roundup in a separate application.
16	Madrone, Alder Manzanita, Ceanothus	Release	2,4-D, Silvex	Use 2,4-D in diesel carrier-use oil/water if alder not important
19	Tan oak, Live oak, Manzanita, Madrone	Release	2,4-D, Silvex	Use 2,4-D in water/oil emulsion.
20	Hazel, Vine Maple, Ribes spp.	Release	2,4-D Silvex	Roundup, Krenite
21,22,23	Ceanothus, Chinkapin, Tan oak	Release	2,4-D, Silvex	2,4-D. Inject chinkapin with picloram.
27	Tan oak, Salal, Manzanita, Rhododendron, Chinkapin, Ocean spray	Site Prep	2,4-D, Silvex	2,4-D. Inject chinkapin
28	Live Oak, Chinkapin, Tan oak	Basal treatment (Fall)	Silvex	Use 2,4-D, amine or picloram
30,31	Manzanita	Release	2,4-D	Use 2,4-D, inject chinkapin
32,33	Tan oak, Salal, Chinkapin, Ocean spray		Silvex	Picloram

8.2.1 Climate

Impacts on summer drought conditions and windthrow losses as a result of microclimate changes would be the same as for the proposed action.

8.2.2 Air Quality

An increase in particulate pollution would occur during the summer near logging activities and roads. As with the proposed action, 173,640 acres of land would be subjected to some degree of occupancy by motor vehicles and other machinery.

The operation of internal combustion engines directly related to the alternative would be likely to increase the amount of pollution from combustion products because more applications of herbicides would be necessary to accomplish the same control as silvex. Without site-specific data on the type of vegetation to be controlled, quantification is not possible.

Smoke pollution would have a minor effect on the visual resource within 5 miles of individual slash disposal burns. Total particulate pollution which would occur as a direct result of slash disposal is the same as that of the proposal.

As substitutes for silvex, 2,4-D, Krenite, picloram and Roundup would be used to control vegetation. Because more total herbicides would be needed to achieve the same degree of control as silvex, the amount of herbicides volatilized would increase over the proposed action. The amount of diesel oil carrier introduced to the atmosphere would increase somewhat, since much more 2,4-D (oil carrier) would be used to replace silvex than Krenite or Roundup (both water carrier) and more herbicides would be needed for similar control. Quantification is not possible at this level.

8.2.3 Soils

Nutrient losses as a result of silvicultural practices, and the total amount of surface disturbance, compaction, and soil erosion that would occur under this alternative are the same as the proposed action.

The amount of herbicides and diesel oil carrier entering the soil would increase somewhat, as was discussed previously. However, contaminants of TCDD would not be introduced into the soil.

8.2.4 Water

8.2.4.1 Water Yield

The water yield from the JSYU in the first year would increase by the same estimated amount as the proposed action.

8.2.4.2 Water Quality

Sediment yield would increase the same estimated amount as it would as a result of the proposed action. This is a decrease in sediment yield compared to the present allowable cut.

While total amount of herbicides used would increase somewhat in this alternative, TCDD contaminants would not be introduced into the watershed from BLM-administered lands.

8.2.5 Vegetation

Impacts to vegetation due to the application of herbicides other than

silvex would be the same as those discussed for the proposed action.

8.2.6 Animals

Impacts from this alternative would be the same as for the proposed action except that there would be no possibility for toxic exposure to, or bioaccumulation of, TCDD.

8.2.7 Recreation

Impacts would be the same as those for the proposed action except:

a. Possible danger to the health and safety of recreationists as a result of the use of herbicides containing dioxin (TCDD) would be eliminated. A slight increase in hiking and camping use would be anticipated.

b. Possible stream contamination as a result of the use of silvex (containing TCDD) would be eliminated. A slight increase in visitor-days associated with fishing use would be anticipated.

8.2.8 Cultural Resources

Impacts would be the same as those for the proposed action.

8.2.9 Visual Resources

Impacts would be the same as those for the proposed action.

8.2.10 Noise

The use of chemicals less effective than silvex would necessitate more helicopter use. Impacts caused by intrusive noise would be slightly greater than those of the proposed action.

8.2.11 Human Health

Possible adverse impacts to human health caused by TCDD would not occur if this alternative were selected.

8.2.12 Socioeconomic Conditions

Estimates of cost for substitute herbicides in lieu of silvex range from 60 to 110 percent of the cost associated with herbicide use in the proposal. Factors involved include direct cost of chemicals, additional aerial applications and labor where picloram injection is the replacement. All other socioeconomic conditions of Alternative 2 are the same as for the proposed action.

8.2.13 Energy Usage

Total energy consumption attributable to this alternative would be approximately 1.316 trillion Btu's. While road items and log production would be the same as the proposal, elimination of silvex would require more spraying of less effective and more costly herbicides to attain a comparable degree of control of competing vegetation.

Energy use for vegetative control would be 160 percent of the amount required in the proposal. However, the energy requirements of the entire alternative would be 1 percent higher and therefore an insignificant additional impact.

8.2.14 Land Use

Impacts to land use, including wilderness, would be the same as those for the proposed action.

8.3 LIMITED INVESTMENT IN TIMBER PRODUCTION ALTERNATIVE NO. 3

This alternative differs from the proposal in that management practices would be limited to those associated with final timber harvest and artificial reforestation. Planned practices would include road construction, shelterwood harvest and clearcutting, slash disposal, site preparation (with herbicides where warranted), and planting.

On high intensity lands the sustainable allowable cut resulting from this alternative is 15.09 MM cu. ft. (77 MM bd. ft.), as shown in Figure 8-2. The additional 1.76 MM cu. ft. (9 MM bd. ft.) harvested on low intensity lands would bring the total planned harvest for Alternative No. 3 to 16.85 MM cu. ft. (86 MM bd. ft.).

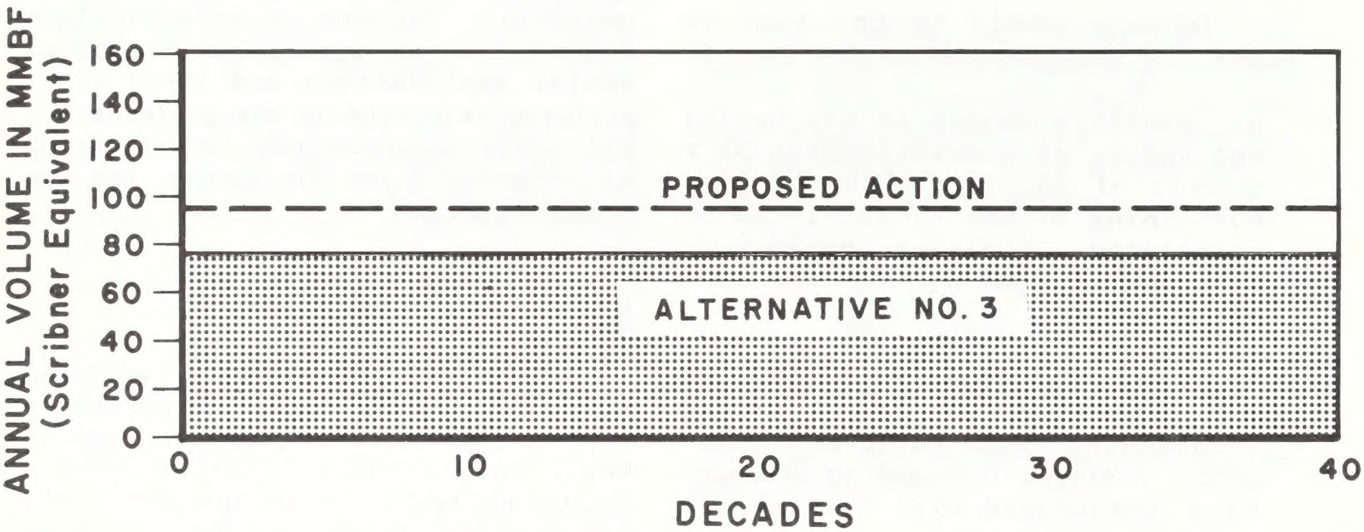


Figure 8-2 COMPARISON OF PROPOSED ANNUAL ALLOWABLE CUT WITH ANNUAL ALLOWABLE CUT USING ALTERNATIVE NUMBER 3

SOURCE: BLM Forest Inventory • 1976

8.3.1 Climate

Impacts to the microclimate would be the same as for Alternative No. 1 except that the summer drought conditions would prevail on 80 percent of the areas considered under the proposed action.

Windthrow losses would be an estimated 8.4 board feet per acre per year.

8.3.2 Air Quality

Impacts to air quality would be the same as for Alternative No. 1 near the logging activities and roads. A total of 90,400 acres would be subjected to some degree of occupancy by motor vehicles and other machinery.

The operation of internal combustion engines directly related to this alternative would increase pollution by the following amounts: nitrogen oxides, 118 tons per year; sulfur oxides, 3.9 tons per year; carbon monoxide, 430 tons per year; and particulates 7.0 tons per year.

Smoke pollution impacts would be identical to Alternative No. 1 except that in the worst case, a 7.5 percent increase in particulate pollution would occur over the JSYU.

The following amounts of herbicide would be estimated to volatilize (to unknown distances) in the worst case under this alternative over 10 years:

Diesel Oil Carrier	12,500 gal.
Silvex (2,4,5-TP)	680 lbs.
2,4-D	680 lbs.
Roundup	477 lbs.
Krenite	477 lbs.
Atrazine	2,000 lbs.
Dalapon	2,062 lbs.

8.3.3 Soils

Nutrient losses from the soils of the areas subjected to the silvicultural practices would be estimated to approach the following totals over 10 years.

Nitrogen:	108,304 lbs.
Phosphorus:	32,322 lbs.
Potassium:	55,440 lbs.
Calcium & Magnesium:	209,313 lbs.

In the worst case, surface disturbance would occur on 15,788 acres of previously undisturbed lands; compaction would occur on 9,957 acres.

The total amount of erosion of soil due to the components of this alternative are estimated as follows:

Yarding and Loading	
Tractor Methods	1,616 tons/year
	2,377 tons total
Cable Methods	90 tons/year
	226 tons total
Transportation System	
New road Construction	66,500 tons/year
	166,300 tons total
Reconstruction & Maintenance	7,500 tons over 10 years

Planting would reduce soil erosion, increase retention of soil moisture and nutrients, and ameliorate extremes of temperature and humidity. Quantification is not possible.

Herbicides entering the soil ecosystem under this alternative would be estimated to approach the following amounts over 10 years:

Silvex (2,4,5-TP)	3,469 lbs.
2,4-D	4,136 lbs.
Roundup	2,268 lbs.
Krenite	2,669 lbs.
Atrazine	44,552 lbs.
Dalapon	22,038 lbs.

8.3.4 Water Resources

Impacts to the water resources of the JSYU would be approximately equal to those of Alternative No. 1,

with one exception. An unknown amount of various combinations of herbicides used in the alternative would contaminate some of the surface waters. The anticipated amounts would be extremely small, most in ranges too small to be detected by present chemical analytical technology.

8.3.5 Vegetation

Alternative No. 3 would entail the same types of impacts as the proposed action with the exceptions that:

a. Approximately 15 percent less old-growth and 13 percent less mature community would be eliminated during the 10-year life of Alternative No. 3 than would be eliminated with the proposed action. If the alternative were implemented into perpetuity, ultimate elimination of mature communities would occur in six decades and elimination of old growth would occur in five decades.

b. Because herbicide spraying would occur on approximately 17,900 fewer acres with this alternative, herbicide impacts to seral community development would be fewer than with the proposed action. This reduction in treatment area would also reduce the probability of adverse impacts to aquatic plants and non-target terrestrial vegetation from herbicide drainage or overspray. Curtailment of herbicide applications for stand release would reduce the production of commercial wood fiber.

c. Because less volume would be harvested annually, soil would be disturbed less. Less soil disturbance would reduce adverse impacts to plant habitat and would also reduce direct plant injury or mortality.

8.3.6 Animals

The same types of impacts as identified for the proposed action can be expected, except that impact intensity would differ. Approximately 14 percent less mature and old growth habitat would be eliminated during the 10-year life of Alternative No. 3 as compared with the proposed action. Therefore, more old-growth habitat would remain after one decade's continuance of this alternative than would remain after one decade's continuance of the proposed action. This would reduce the potential short-term impacts to old-growth dependent species.

Implementation of the limited investment alternative would reduce the number of acres for herbicide treatment from 47,700 acres to about 29,800 acres because no herbicide stand release would be undertaken with the alternative. This would reduce the potential adverse impacts which could result to aquatic habitat from herbicide overspray or drainage. The possibility of toxic exposure to TCDD would also be lowered as would the threat of bioaccumulation. Reduction in the acreage to be sprayed would also allow greater development of early seral stage habitat.

8.3.7 Recreation

Impacts resulting from the implementation of this alternative would be identical to those of the proposed action with the following exceptions:

a. Elimination of thinning or stand release would mean less

alteration of the recreational experience.

b. Fewer areas and opportunities for hiking would be created as a result of the elimination of thinning and stand release. Sightseeing and miscellaneous use would slightly decrease (see Table 8-6).

c. Water quality degradation and related impacts upon fish populations and fishing success would not be as widespread. Fishing use would slightly increase (see Table 8-6).

d. With the elimination of commercial thinning, some hazard trees might remain standing and endanger recreationists.

e. With the elimination of fertilizer application, the possibility of potable water supply contamination or other health hazards would be reduced.

f. With approximately 48,000 acres proposed for harvest under this alternative, an estimated 24,000 acres would be new ground, previously undisturbed and possessing opportunities for solitude and serenity.

8.3.8 Cultural Resources

With fewer timber management activities taking place, there would be less chance of unidentified cultural resources being inadvertently damaged or destroyed.

8.3.9 Visual Resources

The elimination of such activities as fertilizer application, thinning, and stand release would result in a reduced number of short-term adverse impacts but might also hinder long-term enhancement affects resulting from changes in form, line, texture, color, and/or vegetative groupings.

8.3.10 Noise

With fewer timber management operations taking place, noise intrusiveness would be reduced.

8.3.11 Human Health

Approximately 29,800 acres would be subject to herbicide application under this alternative. This is a reduction of 17,900 acres from the proposed action. Any adverse impacts from TCDD would be less with this alternative.

8.3.12 Socioeconomic Conditions

8.3.12.1 Impacts on Annual Timber Sales

Annual timber sales would amount to 17 MM bd. ft. less than with the proposed action. Proposed annual sales (BLM) are 17 percent below the proposed action and 41 percent below that of the existing situation. This change represents, for the Medford Timbershed, a 10 percent reduction from the annual harvest under current management (Table 3-23) and a 10 percent reduction when compared with the proposed action.

8.3.12.2 Impacts on Employment and Personal Income

Direct local employment dependent on harvest and forest development practices during the first decade would be 122 local jobs less than with the proposed action, and 11 jobs fewer in pulp and paper processing

elsewhere in Oregon. For the long-term equilibrium, comparable impacts would be 108 local jobs less than for the proposed action.

Total Josephine County jobs lost (139) as compared to those attributable to the proposal would represent 0.8 percent of total employment in Josephine County during the first decade: in the long term the same decline would be 125 and represent 0.5 percent of total Josephine County employment during that period.

During the first decade, and compared to that of the proposed action, community personal income would decrease by 3.9 million dollars, 0.5 percent of total personal earnings in Josephine, Jackson, and Douglas Counties during 1974.

8.3.12.3 Local Public Finance

During the first decade, annual O&C payment to all counties, again compared to the proposed action, would decline by 1.3 million dollars, which would represent four cents in property tax rate equivalence (based on 1977 assessed valuation.) For Southwest Oregon counties, O&C payments attributable to the JSYU would decrease by 800 thousand dollars. For Josephine and Douglas Counties the O&C payment and property tax rate equivalence would change by: 200 thousand dollars and 25 cents; and 0.3 million dollars and 19 cents, respectively.

8.3.13 Energy Usage

Total energy consumption attributable to this alternative would be approximately 1.092 trillion Btu's. While road items are the same as the proposal, log production would be reduced by 16 percent. Several treatments would be reduced by the same degree. Herbicide release, precommercial thinning and fertilization would be eliminated.

Energy use would be 84 percent of that associated with the proposed action.

8.3.14 Land Use

Impacts on land use, including wilderness, would be the same as for the proposed action.

8.4 UTILIZATION OF SURPLUS INVENTORY ALTERNATIVE NO. 4

This alternative would direct the sale of the maximum amount of timber possible during the first decade without diminishing the sustainable harvest of 18.34 MM cu. ft. (94 MM bd. ft.) in the decades beyond. The objective would be to assist in meeting anticipated short-run national housing needs and to cushion the effect of the proposed allowable cut reduction.

The allowable cut on high intensity lands for this alternative would be 19.41 MM cu. ft. (99 MM bd. ft.) for one decade, as shown in Figure 8-3. With the additional harvest of 1.76 MM cu. ft. (9 MM bd. ft.) on low intensity lands, the total planned harvest for this alternative would be 21.17 MM cu. ft. (108 MM bd. ft).

8.4.1 Climate

Impacts to the microclimate would be the same as described for Alternative No. 1 except that summer drought conditions would prevail on 105 percent of the areas considered under the proposed plan. This means some impact would extend from the

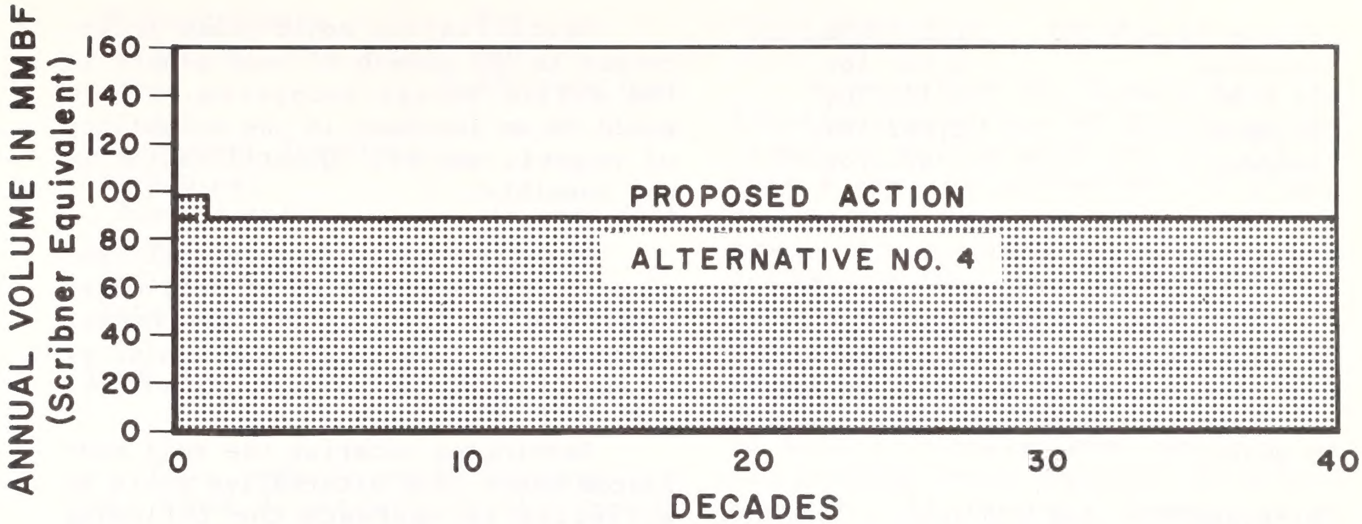


Figure 8-3 COMPARISON OF PROPOSED ANNUAL ALLOWABLE CUT WITH ANNUAL ALLOWABLE CUT USING ALTERNATIVE NUMBER 4
SOURCE: BLM Forest Inventory • 1976

treated area to adjacent untreated areas.

Windthrow losses would be an estimated 10.5 board feet per acre per year.

8.4.2 Air Quality Impacts

Impacts to air quality would be the same as for Alternative No. 1 near the logging activities and roads. A total of 123,060 acres of land would be subjected to some degree of occupancy by motor vehicles and other machinery.

The operation of internal combustion engines directly related to this alternative would cause the following amount of increases in pollution: nitrogen oxides, 149 tons per year; sulfur oxides, 5.0 tons per year; carbon monoxide, 541 tons per year; and particulates, 8.8 tons per year.

Smoke pollution impacts would be identical to Alternative No. 1 except that, in the worst case, a possible 9.8 percent increase in particulate pollution would occur over the JSYU.

The following amounts of herbicides would be estimated to volatilize (to unknown distances) in the worst case in this alternative over 10 years:

Diesel Oil Carrier	21,627 gal.
Krenite	825 lbs.

Silvex (2,4,5-TP)	1,176 lbs.
Atrazine	3,460 lbs.
2, 4-D	1,176 lbs.
Dalapon	3,569 lbs.
Roundup	825 lbs.

8.4.3 Soils

Nutrient losses from the soils of the areas subjected to the silvicultural practices would be estimated to approach the following totals over 10 years:

Nitrogen:	136,070 lbs.
Phosphorus:	40,608 lbs.
Potassium:	69,654 lbs.
Calcium & Magnesium:	262,977 lbs.

In the worst case, surface disturbance would occur on 21,235 acres of previously undisturbed lands; compaction would occur on 13,392 acres.

The total amount of erosion of soil due to the components of this alternative are as follows:

Yarding and Loading		
Tractor methods:	1,194	tons/year
	2,985	tons over 4 years
Cable Methods:	114	tons/year
	284	tons over 4 years
Transportation System		
New Road Construction	66,500	tons/year
	166,300	tons total
Reconstruction & Maintenance	7,500	tons over 10 years
Scarification:	28,125	tons over 4 years (worst case)

Fertilization would cause an increase in the growth of most plants in the entire forest ecosystem. There would be an increase in the solubility of organic matter. Quantification is not possible.

Planting would reduce soil erosion, increase retention of soil moisture and nutrients, and ameliorate extremes of temperature and humidity. Quantification is not possible.

Herbicides entering the soil ecosystem under this alternative would be estimated to approach the following amounts over 10 years:

Silvex (2,4,5-TP)	5,531 lbs.
Atrazine	31,576 lbs.
2,4-D	6,634 lbs.
Dalapon	30,095 lbs.
Roundup	2,790 lbs.
Diesel Oil Carrier	83,400 gal.
Krenite	3,282 lbs.

8.4.4 Water Resources

8.4.4.1 Water Yield

There would be an increase in the average water yield from the JSYU by the following estimated amounts:

Silvicultural Practices:	
Shelterwood Harvest	26,330 acre feet
Clearcut	6,320
Commercial Thinning	2,350
Total	35,000 acre feet
Yarding and Loading Practices:	
Cable Methods	1,349 acre feet
Tractor Methods	7,081
Slash Disposal	316
Total	8,746 acre feet
Transportation System:	
New Roads	8,680 acre feet

Reconstruction	868	
Surfacing	260	
Total	9,808	acre feet

Development Practices:

Mechanical Scarification	16	acre feet
Planting	-7,813	
Fertilization	- 472	
Total	-8,269	acre feet

Total for the Alternative:
45,285 acre feet

This amount would be equal to less than 1 percent of the annual discharge of the Rogue River at Agness, Oregon, in water year 1975, an amount of slight significance to the JSYU.

8.4.4.2 Water Quality

Sediment yield would increase by the following estimated amounts:

Yarding and Load Practices:

Cable Methods	65,300	tons
Tractor Methods	155,130	
Slash Disposal	23,698	
Total	244,128	tons

Transportation System:

New Roads	440,781	tons
Reconstruction	44,756	
Surfacing	30,516	
Total	516,053	tons

Total for the Alternative:
760,181 tons

This compares to an increased yield of 747,839 tons for these practices under the proposed action, and 837,062 tons for the present allowable cut. This would be a significant reduction from the present situation but not a significant change from the proposed action.

8.4.5 Vegetation

Alternative No. 4 would have the identical spectrum of impacts as the proposed action with the exception that a greater amount of old growth and mature vegetative communities would be removed from the high intensity lands during the 10-year life of the alternative. The alternative would remove about 4 percent more old growth and 2 percent more mature communities than the proposal. If this alternative were continued as projected into future decades, however, all of these communities on the high intensity lands would be eliminated at the end of the fifth decade of implementation as they would be with the proposal.

More vegetation would be impacted by logging and development practices in the first decade than with the proposed action. Long-term impacts, if either the alternative or the proposed action were continued into perpetuity, would be approximately equal.

Probability of impact to the limited aquatic vegetation on the high intensity lands would continue to be low under this alternative but increased in the first decade due to the additional 5 MM bd.ft. cut annually. The possible impacts would be the same for the proposed action.

Long-term impacts to terrestrial and aquatic vegetation would be approximately equal if either Alternative No. 4 or the proposed action were continued into perpetuity.

Possible impacts to threatened or endangered vascular plant species due to implementation of Alternative No. 4 would be of the same types as listed for the proposed action.

Since these impacts can occur only when the subject plants are present on a site affected by timber management activities, probability of impact would increase in the first decade due to the 5 MM bd. ft. increase in annual cut and corresponding increase in logging and development practices. The possibility of herbicide impacts to non-target vegetation would be increased with Alternative No. 4, due to the approximately 5 percent greater area of treatment.

In the long term, probability of impact to threatened or endangered vegetation would be the same as for the proposed action until after the fifth decade. Old-growth reserves on the high intensity lands would be depleted by that time, and while the number of acres cut to produce a given volume of timber may vary, the vegetative communities present on regenerated forest land would have a low probability of including any threatened or endangered species.

8.4.6 Animals

Impacts would be identical to the spectrum of impacts in the proposal with the exception that about 6 percent more old-growth and mature habitat would be removed from high intensity lands during the first 10 years than with the proposed action. If this alternative were carried into perpetuity, however, elimination of these habitats from high intensity forest lands would occur at the end of the fifth decade of plan implementation, as would that of the proposed action.

Increased cutting, necessary to provide an additional 5 MM bd. ft. per year would increase ground disturbance over the level of the proposed alternative. This would increase the potential for aquatic habitat damage above the levels anticipated for the proposed alternative. It is not known if the impacts to aquatic organisms would be significantly greater. The approximately 5 percent greater area of herbicide treatment proposed with the alternative would increase the possibility of animal exposure to TCDD dosage and bioaccumulation.

8.4.7 Recreation

Impacts resulting from the implementation of this alternative would be similar to those of the proposed action with the following exceptions:

a. Forest visitors and recreationists who enjoy viewing old-growth specimens would be more adversely affected by this alternative. A slight reduction in visitor days associated with general sightseeing and miscellaneous use would occur (see Table 8-6). This alternative calls for the removal of 25 percent of old growth (versus 24 percent for proposed action) from high intensity lands during the first decade.

b. The increase in timber management activities in the first decade would bring about a slight increase in the magnitude of all impacts of the proposed action. Fishing use would slightly decrease. Increased old-growth harvest would also necessitate additional road construction and would result in the loss of some opportunities to experience solitude and isolation in primitive-type areas. Hunting, camping, and ORV use would slightly increase (see Table 8-6).

c. The destruction of small, undeveloped pristine areas would occur as an estimated 29,000 acres proposed for harvest under this alternative is new, previously undisturbed ground.

8.4.8 Cultural Resources

Impacts would be identical to those of the proposed action with the following fundamental differences:

a. The intensified cutting of old growth during the first decade would adversely affect those people who regard specimens of old growth as examples of "living history."

b. Increased timber cutting in the first decade would increase the chance of unidentified cultural resources being inadvertently damaged or destroyed.

8.4.9 Visual Resources

During the first decade this alternative would result in more landscape alteration and contrast than would be apparent as a result of the proposed action. Impacts identical to those of the proposed action would increase commensurably as cutting is intensified. Forest visitors who extol the virtues and grandeur of old growth and who enjoy viewing these specimens would be especially prone to adverse impacts during the first decade.

8.4.10 Noise

The impact of noise instrusiveness would be the same but slightly greater during the first decade than those of the proposed action.

8.4.11 Human Health

Acreage subject to herbicide application would increase by 2,800 acres under this alternative. Any adverse impacts of TCDD would be expected to increase.

8.4.12 Socioeconomic Conditions

8.4.12.1 Impacts on Annual Timber Sales

Timber sales would be 5 MM bd. ft. above the level in the proposed action. At this rate, annual sales would be nearly 5 percent greater than that resulting from the proposed action but 26 percent below that of the existing situation.

This change represents, for the Medford Timbershed, about 8 percent of the annual harvest projected by Beuter et al. (Table 3-23), or a 0.8 percent increase compared to the proposed action.

The above results are pertinent for the first decade only. From the second decade on, this alternative would have social and economic impacts identical with the proposed action. The reduction in sales at the end of the first decade would be an amount significantly less than the average year-to-year variation during recent history.

8.4.12.2 Impacts on Employment and Personal Income

Direct local employment dependent on harvest and forest development practices during the first decade would be 34 local jobs more than with the proposed action, and 3 jobs more in pulp and paper processing elsewhere

in Oregon. For the long-term equilibrium, comparable impacts would be virtually the same as for the proposed action.

Total Josephine County jobs gained (38) as compared to those attributable to the proposal would represent 0.3 percent of total employment in Josephine County during the first decade: in the long term, employment would be the same as for the proposed action.

During the first decade, and compared to that of the proposed action, community personal income would increase by 1.0 million dollars, 0.1 percent of total personal earnings in Josephine, Jackson, and Douglas Counties during 1974.

8.4.12.3 Impacts on Local Public Finance

During the first decade, annual O&C payment to all counties, again compared to the proposed action would increase by $300,000 which would represent $.01 in property tax rate equivalence (based on 1977 assessed valuation). For southwest Oregon counties, O&C payment attributable to the JSYU would increase by $0.2 million. For Josephine and Douglas County the O&C payment and property tax rate equivalence would increase by: less than $100,000 and $.03; and $10,000 and $.06, respectively.

8.4.13 Energy Usage

Total energy consumption attributable to this alternative would be approximately 1.367 trillion Btu's. While road items are the same as the proposal, log production and post-logging treatments would be increased approximately 5 percent.

Energy use would be 104 percent of that associated with the proposal. This is not considered to be a significant increase in the energy consumption impact.

8.4.14 Land Use

Impacts on land use, including wilderness, would be the same as the proposal.

8.5 FORESTRY PROGRAM FOR OREGON ALTERNATIVE NO. 5

This alternative would direct the sale of 22.87 MM cu. ft. (117 MM bd. ft.) from high intensity lands and 1.76 million cubic feet (9 MM bd. ft.) from low intensity lands in the first decade.

The recently published Forestry Program for Oregon (Oregon State Board of Forestry 1977), asked for certain levels of timber supply from BLM-administered forests. Although boundaries of timbersheds, as defined in the publication, and BLM administrative units are different, pro-rata timber production requested from the JSYU as shown above is provided in the first decade. Sequential decadal harvests sought for the second, third and fourth decades are respectively 25.02 MM cu. ft. (128 MM bd. ft.), 26.79 MM cu. ft. (137 MM bd. ft.) and 28.75 MM cu. ft. (147 MM bd. ft.) with continuing harvest level of similar magnitude in future decades.

Assuming 1.76 million cubic feet annual harvest from the low intensity lands, the JSYU could produce timber at the suggested level for the four decades. Thereafter, however, the capacity to continue these cuts would cease since lands allocated to sustained yield timber production (high intensity lands) would then

have been reduced to timber stands in the 60-year age class and younger. The sustainable allowable cut from high intensity lands would then be 8.38 MM cu. ft. (43 MM bd. ft.), as shown in Figure 8-4.

8.5.1 Climate

Impacts to the microclimate would be the same as described for Alternative No. 1 except that summer drought conditions would prevail on 123 percent of the areas considered under the proposed action.

Windthrow losses would be an estimated 12.3 board feet per acre per year.

8.5.2 Air Quality

Impacts to air quality would be the same as for Alternative No. 1 near the logging activities and roads. A total of 206,906 acres of land would be subject to some degree of occupancy by motor vehicles and other machinery.

The operation of internal combustion engines directly related to this alternative would cause the following amount of increases in pollution: nitrogen oxides, 173 tons per year; sulfur oxides, 5.8 tons per year, carbon monoxide, 629 tons per year, and particulates, 10.3 tons per year.

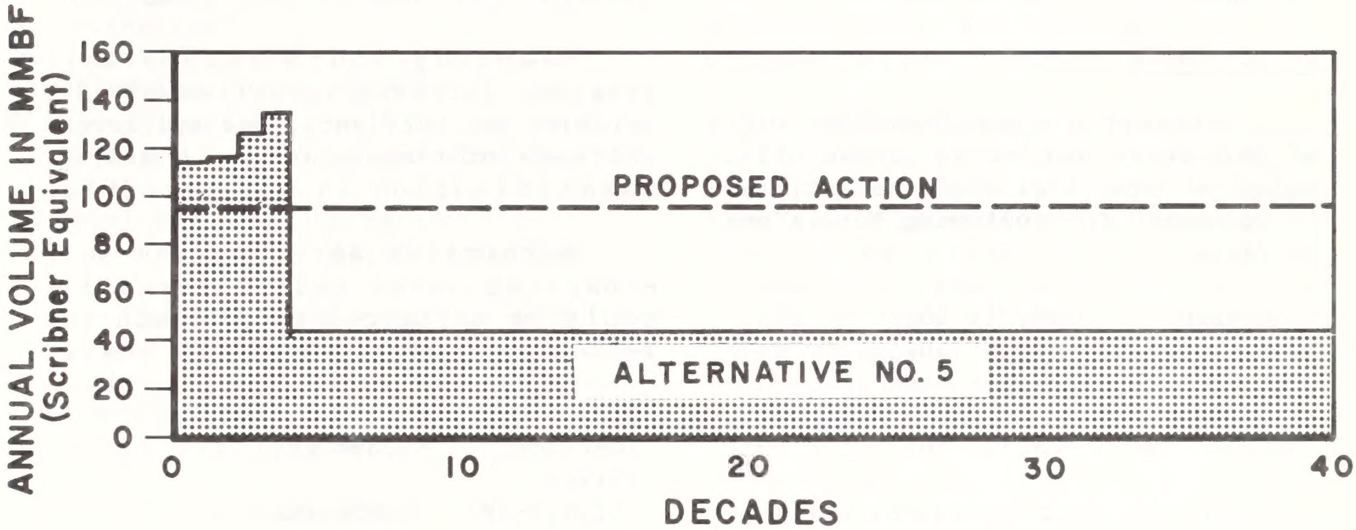


Figure 8-4 COMPARISON OF PROPOSED ANNUAL ALLOWABLE CUT WITH ANNUAL ALLOWABLE CUT USING ALTERNATIVE NUMBER 5

SOURCE: BLM Forest Inventory • 1976

Smoke pollution impacts would be identical to Alternative No. 1, except that, in the worst case, a possible 11.1 percent increase in particulate pollution would occur over the JSYU in the first decade.

The following amounts of herbicides would be estimated to volatilize (to unknown distances) in the worst case in the alternative over 10 years:

Diesel Oil Carrier	23,832 gal.
Silvex (2,4,5-TP)	1,296 lbs.
2,4-D	1,296 lbs.
Roundup	909 lbs.
Krenite	909 lbs.
Atrazine	3,913 lbs.
Dalapon	3,913 lbs.

8.5.3 Soils

Nutrient losses from the soils of the areas subjected to the silvicultural practices would be estimated to approach the following totals over 10 years:

Nitrogen:	158,311 lbs.
Phosphorus:	47,245 lbs.
Potassium:	81,039 lbs.
Calcium & Magnesium:	305,957 lbs.

In the worst case, surface disturbance would occur on 23,399 acres of previously undisturbed lands; compaction would occur on 14,757 acres.

The total amounts of erosion of soil due to the components of the alternative would be as follows:

Yarding and Loading
- Tractor Methods: 1,390 tons/year; 3,474 tons over 4 years
- Cable Methods: 133 tons/year; 331 tons over 4 years

Transporation System
- New Road Construction: 67,000 tons/year; 167,500 tons total
- Reconstruction and Maintenance: 7,500 tons over 10 years

Scarification: 28,125 tons over 4 years

Fertilization would cause an increase in the growth of most plants in the entire forest ecosystem. There would be an increase in the solubility of organic matter. Quantification is not possible.

Planting would reduce soil erosion, increase retention of soil moisture and nutrients, and ameliorate extremes of temperature and humidity. Quantification is not possible.

Herbicides entering the soil ecosystem under this alternative would be estimated to approach the following amounts over 10 years:

Diesel Oil Carrier	89,896 gal.
Silvex (2,4,5-TP)	5,458 lbs.
2,4-D	6,547 lbs.
Roundup	2,753 lbs.
Krenite	3,037 lbs.
Atrazine	31,159 lbs.
Dalapon	29,697 lbs.

8.5.4 Water Resources

8.5.4.1 Water Yield

There would be an increase in the water yield from the JSYU by the following estimated amounts:

Silvicultural Practices:	
Shelterwood Harvest	30,634 acre feet
Clearcut	7,352
Commercial Thinning	2,350
Total	40,336 acre feet

Yarding and Loading Practices:	
Cable Methods	1,570 acre feet
Tractor Methods	8,238
Slash Disposal	368
Total	10,176 acre feet

Transportation System:	
New Roads	8,680 acre feet
Reconstruction	868
Surfacing	260
Total	9,808 acre feet

Development Practices:	
Mechanical Scarification	16 acre feet
Planting	-7,813
Fertilization	- 472
Total	-8,269 acre feet

Total for the Alternative:
52,051 acre feet

This amount would be equal to 1.1 percent of the annual discharge of the Rogue River at Agness, Oregon, in water year 1975; an amount of slight significance to the JSYU.

8.5.4.2 Water Quality

Sediment yield would increase by the following estimated amounts over the average of water year 1975:

Yarding and Load Practices:	
Cable Methods	75,973 tons
Tractor Methods	180,484
Slash Disposal	27,570
Total	284,027 tons

Transportation System	
New Roads	440,781 tons
Reconstruction	44,756
Surfacing	30,516
Total	516,050 tons

Total for the Alternative:
800,077 tons

This compares to an increased yield of 747,839 tons for these practices under the proposed action, and 837,062 tons for the present allowable cut. This would be a significant increase compared to the proposal.

8.5.5 Vegetation

The implementation of Alternative No. 5 would intensify all vegetation impacts discussed in Chapter 3. Major differences in impact intensity between this alternative and the proposed action include:

a. Approximately 5 percent more old-growth (200+ years) community and approximately 6 percent more mature (120-190 years) community would be eliminated from high intensity lands during the 10-year life of this alternative than with the proposed action. If either alternative were implemented into perpetuity, ultimate elimination of old growth would occur in the third decade with Alternative No. 5 and the fifth decade with the proposed action.

b. A greater amount of soil disturbance would occur during the first decade of Alternative No. 5 than would under the proposal. This would increase the amount of plant habitat alteration as well as the amount of direct injury or mortality to plants.

c. About 18 percent more herbicide and fertilizer application would be

necessitated with this alternative. This difference would increase the potential impacts to aquatic plants which would result from herbicide overspray and fertilizer or herbicide drainage.

8.5.6 Animals

Alternative No. 5 would intensify all impacts to animals discussed in Chapter 3. Approximately 5 percent more of the existing old-growth habitat on high intensity lands would be eliminated during the first decade of alternative implementation than if the proposal were implemented. Complete elimination of old-growth habitat would occur in the third decade under this alternative compared with the fifth decade for the proposed action. Therefore, both short-term and long-term impacts to old-growth dependent species would be greater with Alternative No. 5 than with the proposed action. Approximately 6 percent more mature (120-190 yrs.) habitat would be removed with the alternative than with the proposal.

A greater amount of soil disturbance would occur during the first decade of Alternative No. 5 than would under the proposal. This increased soil disturbance would increase the potential for damage to the aquatic ecosystem via increases in sedimentation. Fertilizer and herbicide runoff potential would also be greater because about 7 percent more area would be treated. Similarly, because of the increased management activity, a greater amount of early seral stage habitat would be available for dependent animal species. The degree of benefit that this habitat would provide cannot be determined because the effects of herbicide treatments and fertilization on carrying capacity have not been documented. Although more early seral habitat would be available, the effects of herbicide-induced seral truncation would reduce its carrying capacity.

8.5.7 Recreation

If this alternative were implemented, the first decade would be characterized by harvest of more of the existing old growth on high intensity lands than under the proposed action. The following three decades would also be characterized by increased old-growth harvesting. As harvesting and management intensity increases on public land, more alteration of the recreation experience can be expected. This alternative would intensify all of the impacts to recreation resources associated with the proposed action's timber management and road construction activities. Increased harvest would also necessitate extension of the logging road network, reducing the serenity, solitude, and isolation afforded in undisturbed areas. Approximately 29,250 acres of harvested land would be new, previously undisturbed, ground. While hunting, camping, and ORV use would probably increase, general sightseeing, fishing, and miscellaneous use reductions would be expected (see Table 8-6). Both short-term and long-term impacts to recreation would be greater with this alternative than with the proposed action.

8.5.8 Cultural Resources

Increased timber management activity and associated ground surface disturbance would increase the risk of unidentified cultural sites being inadvertently damaged or destroyed. Other impacts associated

with the proposed action would also be intensified under this alternative.

8.5.9 Visual Resources

The effects of intensified old-growth harvest would adversely impact those people who appreciate the transcendent beauty of these specimens. Impacts of this alternative would be the same as those for the proposed action but would be intensified.

8.5.10 Noise

The impacts of noise intrusiveness would be greater during the first four decades as a result of the implementation of this alternative rather than the proposed action.

8.5.11 Human Health

Herbicide application would occur over 57,000 acres in this proposal, an increase of 9,300 acres in the proposed action. Any adverse impacts of TCDD would be expected to increase.

8.5.12 Socioeconomic Conditions

8.5.12.1 Impact on Annual Timber Sales

The annual sales would be 21 percent, 40 percent, 50 percent, and 60 percent above the proposed action for the first decade through the fourth. Sales would be 45 percent less than under the proposed action for subsequent decades (long term). The average for the first four decades would be 134 MM bd. ft., 30 percent above the proposed action. During the same period, the allowable sales would be 8 percent less than existing allowable sales.

8.5.12.2 Impacts on Employment and Personal Income

Direct local employment dependent on harvest and forest development practices during the first decade would be 137 more local jobs than the proposed action, and 13 more jobs in pulp and paper processing elsewhere in Oregon. For the long-term equilibrium, comparable impacts would be 236 fewer local jobs than for the proposed action.

Total Josephine County jobs gained (143) as compared to those attributable to the proposal would represent 0.8 percent of total employment in Josephine County during the first decade: In the long term jobs would be 244 less than with the proposal and represent a reduction of 1.2 percent of total Josephine County employment during that period.

During the first decade, and compared to that of the proposed action, community personal income would increase by 4.4 million dollars, 0.6 percent of total personal earnings in Josephine, Jackson, and Douglas Counties during 1974. Based on 1974 earnings, long-term personal income would be $9.2 million less per year.

8.5.12.3 Local Public Finance

During the first decade, annual O&C payment to all counties, again compared to the proposed action would increase by 1.5 million dollars, which would represent $.04 in property tax rate equivalence (based on 1977 assessed valuation). For southwest Oregon counties, O&C payments attributable to the JSYU would increase by 1 million dollars. For Josephine and Douglas County the O&C payment and property tax rate equivalence would

increase by: $200,000 and $.27; and $400,000 and $.21, respectively.

8.5.13 Energy Usage

Total energy consumption attributable to the alternative would be approximately 1.572 trillion Btu's. Road items are the same as the proposal. Log production, post-logging treatments and most intensive management practices would increase approximately 19 percent.

Energy use would be 117 percent of that associated with the proposal.

8.5.14 Land Use

The impacts on land use, including wilderness, would be essentially the same as with the proposed action. Any wilderness or primitive values on O&C lands suitable for sustained yield timber management would be lost sooner under this alternative than under the proposal.

8.6 ZANE GREY WILDERNESS STUDY AREA ALTERNATIVE NO. 6

This alternative provides for removal of approximately 7,800 acres of high intensity timber management land from the base upon which the proposal was calculated pending study to determine the suitability of the Zane Grey area for wilderness designation. The sustainable allowable cut expected to result from this alternative is 17.69 MM cu. ft. (90 MM bd. ft.) as shown in Figure 8-5,

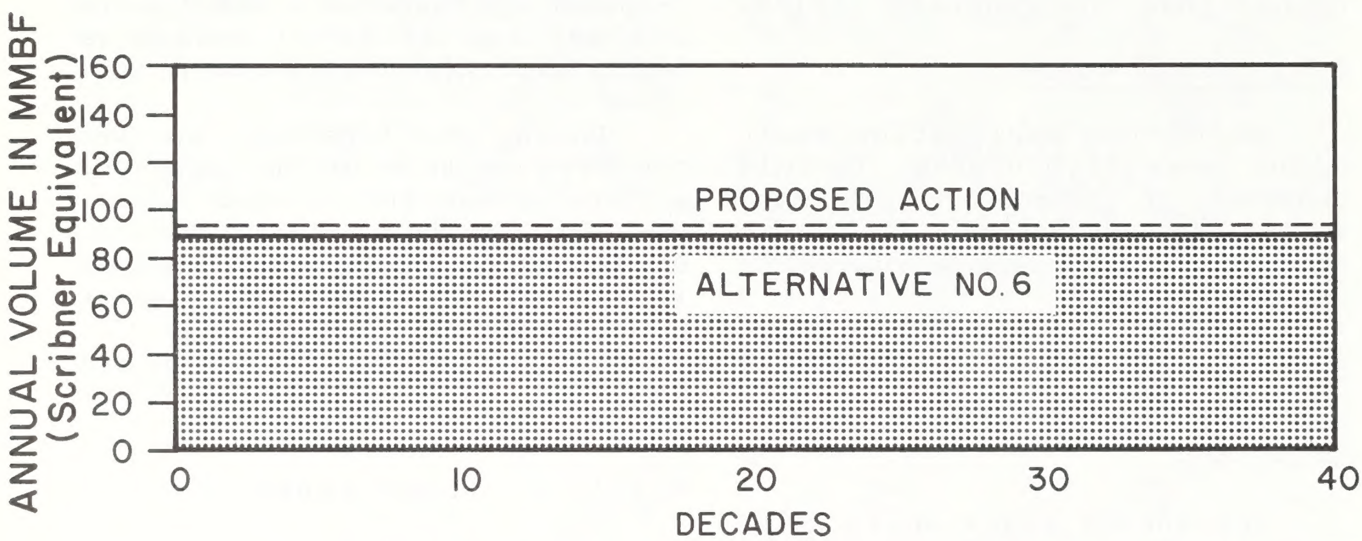


Figure 8-5 COMPARISON OF PROPOSED ANNUAL ALLOWABLE CUT WITH ANNUAL ALLOWABLE CUT USING ALTERNATIVE NUMBER 6
SOURCE: BLM Forest Inventory • 1976

compared to 18.34 MM cu. ft (94 MM bd. ft.) for the proposed action. With the additional 1.76 MM cu. ft. (9 MM bd. ft) harvested on low intensity lands, the total planned harvest for Alternative No. 6 would be 19.45 MM cu. ft. (99 MM bd. ft.).

The area as shown in Figure 8-6 contains a total of approximately 53,000 acres and is the area identified as the Zane Grey and Whiskey Creek Roadless Areas in the publication The Wilderness Review Program of the Bureau of Land Management in Oregon (OSPIRG 1978). Included within this 53,000 acres are the 24,000 acres discussed in Section 2.1.4.6, previously identified as the Big Windy-Bunker Creek potential primitive area.

8.6.1 Climate

Impacts to the microclimate would be the same as for Alternative No. 1 except that the summer drought conditions would prevail on 97 percent of the areas considered under the proposed action.

Windthrow losses would be an estimated 9.7 board feet per acre per year. This is a decrease of 0.3 board feet per acre per year from the proposed action.

8.6.2 Air Quality

An increase in particulate pollution would occur during the summer near the logging activities and roads. A total of 167,760 acres of land would be subjected to some degree of occupancy by motor vehicles and other machinery.

The operation of internal combustion engines directly related to the alternative would cause the following amount of increases in pollution: nitrogen oxides, 136 tons per year; sulfur oxides, 4.5 tons per year; carbon monoxide, 497 tons per year; and particulates, 8.1 tons per year.

Smoke pollution would have a minor effect on the visual resource within 5 miles of individual burning events (slash disposal). In the worst case, a possible 9.0 percent increase in total particulate pollution would occur due to slash disposal directly related to this alternative.

8.6.3 Soils

Nutrient losses from the soils of the areas subjected to the silvicultural practices would be estimated to approach the following totals over 10 years:

Nitrogen:	125,016 lbs.
Phosphorus:	37,309 lbs.
Potassium:	63,995 lbs.
Calcium & Magnesium:	234,948 lbs.

Surface disturbance would occur on an estimated 19,000 acres (in the worst case); compaction would occur on 11,983 acres (estimated, in the worst case).

The total amount of erosion for the components of the alternative are estimated as follows:

Yarding and Loading	
Tractor methods	1,097 tons/year
	2,743 tons total
Cable methods	105 tons/year
	261 tons total
Transportation System	
New Road Construction	66,500 tons/year

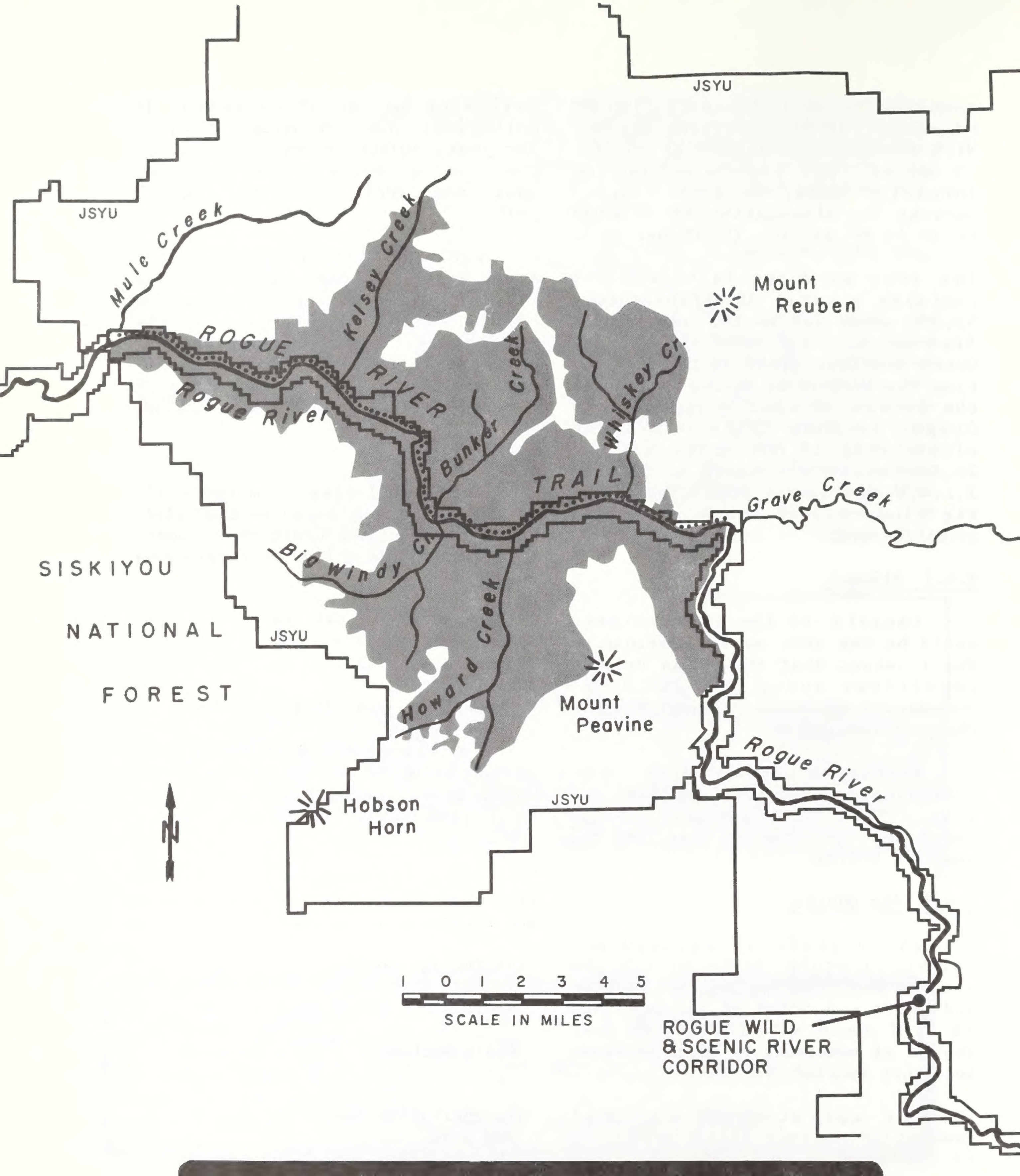


Figure 8-6 ZANE GREY WILDERNESS STUDY AREA ALTERNATIVE NUMBER 6

	166,300 tons total
Reconstruction and maintenance	7,500 tons over 10 years

Fertilization would cause an increase in the growth of most plants in the entire forest ecosystem. There would be an increase in the solubility of organic matter. Quantification is not possible.

Planting would reduce soil erosion, increase retention of soil moisture and nutrients, and ameliorate extremes of temperature and humidity.

8.6.4 Water Resources

8.6.4.1 Water Yield

There would be an increase in the water yield from the JSYU the first year of the following estimated amounts:

Silvicultural Practices:	
Shelterwood Harvest	24,192 acre feet
Clearcut	5,806
Commercial Thinning	2,350
Total	32,348 acre feet
Yarding and Loading Practices:	
Cable Methods	1,240 acre feet
Tractor Methods	6,506
Slash Disposal	290
Total	8,036 acre feet
Transportation System:	
New Roads	8,680 acre feet
Reconstruction	868
Surfacing	260
Total	9,808 acre feet
Development Practices:	
Mechanical Scarification	16 acre feet
Planting	-7,813
Fertilization	- 472
Total	-8,269 acre feet
Total for the Alternative:	41,923 acre feet

This amount would equal 0.8 percent of the annual discharge of the Rogue River at Agness, Oregon, in water year 1975. This amount is of slight significance to the JSYU.

8.6.4.2 Water Quality

Sediment yield would increase by the following estimated amounts over the average of water year 1975:

Yarding and Load Practices:	
Cable Methods	59,995 tons
Tractor Methods	142,526
Slash Disposal	21,772
Total	224,293 tons
Transportation System:	
New Roads	440,781 tons
Reconstruction	44,756
Surfacing	30,516
Total	516,053 tons
Total for the Alternative:	740,346 tons

This compares to an increased yield of 747,839 tons for these practices under the proposed action, and 837,062 tons for the present allowable cut. This would be a significant reduction from the present allowable cut but not from the proposed action.

8.6.5 Vegetation

Impacts to vegetation using Alternative No. 6 would be basically

the same as for the proposed action with the following exceptions:

a. A slight reduction in impacts to seral community development would occur due to 1,500 fewer acres being sprayed with herbicides.

b. Because less volume would be harvested annually somewhat less soil disturbance would occur, resulting in reduced adverse impacts to plant habitat.

8.6.6 Animals

This alternative would mean retention of existing vegetation on approximately 7,800 acres of high intensity lands, at least until the wilderness study is completed. Depending on the results of the study, these acres could be withdrawn from harvest for perpetuity or returned to the allowable cut base if formal wilderness designation is rejected.

During the time the area remains unharvested, the following impacts could be expected:

a. Probable reduction in sediment reaching flowing waters due to less road construction. This would result in less aquatic habitat degradation and less mortality to aquatic organisms.

b. Fewer acres being treated with TCDD contaminated herbicides with a reduction in possibility of toxic exposure or bioaccumulation.

c. Retention of 7,800 acres of existing habitat and its concomitant wildlife populations in its current state.

d. Reduction in the number of acres of early seral stage vegetation and its wildlife populations that would have resulted from forestry practices on those acres.

8.6.7 Recreation

Impacts would be the same as those for the proposed action except:

a. The 53,000 acre area to be studied would provide opportunities for high quality recreational experiences in appreciative-symbolic activities.

b. While camping, hiking, and general sightseeing opportunities would be available within this area, the lack of roads would make access difficult. For this reason, recreational use in activities oriented toward appreciation and preservation of the environment would only be expected to slightly increase. Some activities requiring vehicular access would be precluded.

c. Water quality degradation and related impacts upon fish populations and fishing success would not be as widespread. Fishing use would slightly increase.

d. There would be slightly fewer recreational opportunities for hunters. Populations of predominant game species such as deer and elk would not increase as they might under the proposed action because food supplies would not be as great. Accessibility for hunters would also be impeded in the area to be studied.

e. Within the area to be studied, the elimination of the "edge effect" created by cutting practices would limit the diversity of animal

species that would occur under the proposed action. While this could adversely affect some naturalists and birdwatchers, more opportunities would be available in the area to observe unusual species or habitat associated with unharvested forests.

f. Some 900 acres of the 27,500 acres of small, undeveloped pristine areas within the SYU are within the study area. Protection from alteration is assured for at least the short term under the alternative.

8.6.8 Cultural Resources

Impacts would be the same as those for the proposed action with the exception that there would be no danger of damage or destruction to unidentified cultural resources due to timber management actions within the boundaries of the 53,000 acre area being studied.

8.6.9 Visual Resources

The natural succession and variety of plant and tree species within this 53,000 acre area and the occurrence of occasional old-growth timber stands would be generally pleasing to most visitors. Portions of the study area are outside the viewshed of the Rogue River Corridor. At higher elevations the recreationist would be able to see past and future logging areas across the river, a possible adverse impact on the wilderness experience.

Foreclosure of new road construction during the study period would eliminate impacts of smell, sound and dust as compared with impacts of the proposal.

Within the area to be studied, the increased presence of lightning-susceptible dead trees or snags could increase the risk of natural-caused fires. However, the area could be included in the special fire protection zone which applies to the Wild Rogue Corridor.

The maintenance of this area in a primitive state would, in some cases, preclude the use of timber management activities to enhance visual resources.

8.6.10 Noise

Solitude and tranquility would be available within the 53,000 acre area to be studied. Impacts resulting from intrusive noise would be less than for the proposed action.

There would also be less likelihood of noise disturbance in the Rogue Wild and Scenic River corridor.

8.6.11 Human Health

Possible adverse impacts from herbicide use, including TCDD, would be slightly reduced since 46,200 acres would be subject to herbicide application under this alternative.

8.6.12 Socioeconomic Conditions

8.6.12.1 Impacts on Annual Timber Sales

Annual timber sales are less than that of the proposed action by 4 percent in the first decade and all subsequent decades. Total sales for the timbershed would decline negligibly.

8.6.12.2 Impacts on Employment and Personal Income

Direct local employment dependent on harvest and forest development practices during the first decade would be 26 local jobs less than for the proposed action, and a 3-job decline in pulp and paper processing elsewhere in Oregon. For the long-term equilibrium, comparable impacts would be the same.

A decline in total Josephine County jobs (56) as compared to those attributable to the proposal would amount to a 0.3 percent decrease in total employment in Josephine County.

During the first decade, and compared to that of the proposed action, community personal income would decrease by $900,000, 0.1 percent of total personal earnings in Josephine, Jackson, and Douglas Counties during 1974.

8.6.12.3 Local Public Finance

During the first decade, annual O&C payment to all counties, again compared to the proposed action would decrease by $300,000, which would represent $0.01 in property tax rate equivalence (based on 1977 assessed valuation). For southwest Oregon counties, O&C payments attributable to the JSYU would increase by $200,000. For Josephine and Douglas County the O&C payment and property tax rate equivalence would change by: less than $100,000 and $0.05; and $0.1 million and $0.04, respectively.

8.6.13 Energy Usage

Total energy consumption attributable to the alternative would be approximately 1.250 trillion Btu's. The approximately 1 percent reduction in energy use is directly related to 4 million board feet reduction in log production. The energy impact is not significantly reduced.

Should the alternative be adopted, the study findings favorable, and the area designated a wilderness by Congress, other impacts on energy usage could ensue. Dispersed recreation such as wilderness hiking, hunting or fishing have an energy investment of 20,000 Btu's per dollar of value (Brown 1978). Since potential increase of usage for wilderness appreciation motives appear to balance with decreased access for hunting (see Section 8.6.7), it is concluded that significant additional energy impacts are unlikely.

8.6.14 Land Use

Impacts to land use would be the same as those discussed for the proposed action, except for wilderness. The absence of commercial timber operations within this area would perpetuate the wilderness values afforded by the area's pristine character.

8.7 NO ACTION ALTERNATIVE NO. 7

This alternative assumes continuation of the current level of timber management on the Josephine SYU; that is, continuation of the current allowable cut of 28.63 MM cu. ft. (146 MM bd. ft.) on the present timber management base of 334,500 acres. Implicit in that premise is the biological assumption that 116,000 acres will not regenerate after harvest. The 28.63 MM cu. ft. (146 MM bd. ft.) cut level can be sustained on this basis for nine

decades, after which the allowable cut would decline to 17.06 MM cu. ft. (87 MM bd. ft.), as shown in Figure 8-7.

8.7.1 Climate

Impacts to the microclimate would be the same as described for Alternative No. 1 except that summer drought conditions would prevail on 138 percent of the areas considered under the proposed action.

Windthrow losses would be an estimated 13.8 board feet per acre per year.

8.7.2 Air Quality

Impacts to air quality would be the same as for Alternative No. 1 near the logging activities and roads. A total of 65,900 acres of land would be subject to some degree of occupancy by motor vehicles and other machinery.

The operation of internal combustion engines directly related to this alternative would cause the following increases in pollution: nitrogen oxides, 201 tons per year; sulfur oxides, 6.5 tons per year, carbon monoxide, 731 tons per year, and particulates, 12.0 tons per year. These would be somewhat higher than those for the proposal and are of slight significance.

8.7.3 Soils

Nutrient losses from the soil of the areas subjected to the silvicultural practices would be estimated to

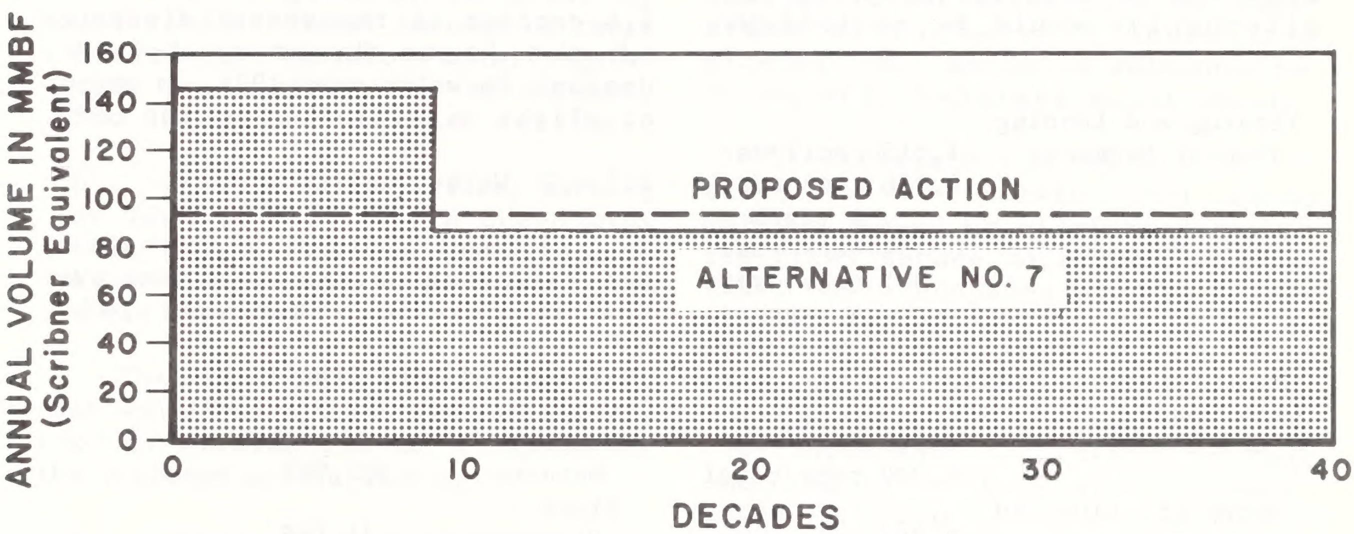


Figure 8-7 COMPARISON OF PROPOSED ANNUAL ALLOWABLE CUT WITH ANNUAL ALLOWABLE CUT USING ALTERNATIVE NUMBER 7
SOURCE: BLM Forest Inventory • 1976

approach the following totals over 10 years:

Nitrogen:	184,021 lbs.
Phosphorus:	54,918 lbs.
Potassium:	94,200 lbs.
Calcium & Magnesium:	355,646 lbs.

Planting would reduce soil erosion, increase retention of soil moisture and nutrients, and ameliorate extremes of temperature and humidity. Quantification is not possible.

In the worst case, surface disturbance would occur on 21,577 acres of previously undisturbed lands; compaction would occur on 13,608 acres of land.

The total amounts of erosion of soil due to the components of this alternative would be as follows:

Yarding and Loading	
Tractor Methods:	1,615 tons/year
	4,038 tons over 4 years
Cable Methods:	154 tons/year
	385 tons over 4 years
Transportation System	
New Road Construction	66,500 tons/year
	166,300 tons/total
Reconstruction and Maintenance	7,500 tons over 10 years

8.7.4 Water Resources

8.7.4.1 Water Yield

There would be an increase in the water yield from the JSYU by the following estimated amounts:

Silvicultural Practices:	
Shelterwood Harvest	34,627 acre feet
Clearcut	8,311
Commercial Thinning	2,350
Total	5,288 acre feet
Yarding and Loading Practices:	
Cable Methods	1,774 acre feet
Tractor Methods	9,312
Slash Disposal	416
Total	11,502 acre feet
Transportation System:	
New Roads	8,680 acre feet
Reconstruction	868
Paving	260
Total	9,808 acre feet
Total for the Alternative:	66,598 acre feet

This amount would be equal to 1.4 percent of the annual discharge of the Rogue River at Agness, Oregon, in water year 1975, an amount of slight significance to the JSYU.

8.7.4.2 Water Quality

Sediment yield would increase by the following estimated amounts over the average of water year 1975:

Yarding and Load Practices:	
Cable Methods	85,876 tons
Tractor Methods	203,968
Slash Disposal	31,165
Total	321,009 tons
Transportation System:	
New Roads	440,781 tons
Reconstruction	44,756
Surfacing	30,516
Total	516,053 tons
Total for the Alternative:	837,062 tons

This compares to a total yield of 3,499,856 tons for the proposed action, and 4,829,800 tons for the present allowable cut. This would have major localized impacts to fragile sites. Significant amounts of sediment would be produced.

8.7.5 Vegetation

Alternative No. 7 would have basically the same short-term impacts on vegetation as the proposed action although impact intensity would be greatly increased. Major differences in impact intensity include:

a. Timber harvest would occur on a different land base under the alternative. Much of this additional land base (116,000 acres) has been identified as fragile sites, whereon regeneration would be uncertain. Timber harvest on these lands would therefore alter vegetative productivity for an unknown, but lengthy, period of time.

b. Because no herbicides, burning or fertilization would occur with this alternative, potential impacts associated with these practices would not occur.

The additional residual impacts that would accrue from the implementation of Alternative No. 7 instead of the proposed action include:

a. Loss of approximately 39 percent more of the old-growth community than the proposal on all O&C lands within the JSYU except for those within the Rogue River Corridor and other miscellaneous withdrawn areas (acreage of old growth unknown).

b. Loss of additional endangered species habitat over that which would be lost if the proposal were implemented. The extent of this additional loss cannot be quantified.

8.7.6 Animals

Continuation of the present level of cut would result in substantial long-term impacts to terrestrial and aquatic habitats. This alternative would call for timber harvest from all lands except for those withdrawn in the 1970 allowable cut declaration. Because no acreage was specifically withdrawn for the protection of threatened or endangered animals, the no action alternative would eliminate most of the spotted owl habitat in the JSYU.

Approximately 116,000 acres of land would not be expected to regenerate after harvest under this alternative. Excessive sedimentation of aquatic habitats would result.

Approximately 35 percent (44,315 acres) of old-growth (200+ years) habitat would be eliminated during the first decade under this alternative. This compares with 24 percent (26,617 acres) for the first decade under the proposed action. If Alternative No. 7 were implemented into perpetuity virtually all the old-growth habitat, except for that remaining in the Rogue River Corridor, would be eliminated by the fourth decade as compared with the fifth decade if the proposed alternative were implemented.

The residual impacts that would result from the implementation of Alternative No. 7 for a 10-year period include:

a. Loss of approximately 35 percent of the old-growth habitat

on all O&C lands within the JSYU except for those within the Rogue River Corridor and other miscellaneous withdrawn areas (acreage of old growth unknown).

b. Reduced productivity or possible loss of an unknown amount of cold water fish habitat due to increased sedimentation, increased water temperatures and alteration of stream flows.

c. Loss of virtually all of the spotted owl (threatened status - Oregon Department of Fish & Wildlife list) habitat on O&C lands within JSYU.

d. Elimination of habitat productivity on approximately 4,340 acres of land that would be dedicated to roadways.

8.7.7 Recreation

Continuing the current level of timber harvest in the JSYU would result in a number of adverse impacts for recreationists. Impacts would be similar to those for the proposed action but would be intensified significantly. Severe degradation of the recreational experience and limitation of quality recreational opportunities would be the outcome of this alternative's implementation. The adoption of this alternative would preclude the proposed action's land withdrawals for potential recreation opportunities. Also, some opportunity for serenity and isolation would be lost as continuation of this harvest level would necessitate the construction of roads into a greater number of small unroaded primitive-type areas than anticipated under the proposed action. Hunting, camping, and ORV use would probably increase slightly, while general sightseeing, fishing, and miscellaneous use would decrease (see Table 8-6). During the first decade 35 percent of the old growth would be harvested (compared to 24 percent under the proposed action).

The destruction of small, undeveloped pristine areas would be most apparent under this alternative. Approximately 32,800 acres of land proposed for timber harvest would be new, previously undisturbed, ground.

8.7.8 Cultural Resources

Continuing at the present level of timber harvest on the JSYU would increase the chance of unidentified cultural sites being inadvertently damaged or destroyed. Impacts on cultural resources are essentially the same as those for the proposed action but to a greater degree.

8.7.9 Visual Resources

Maintaining the current level of allowable timber harvest on the JSYU during the first nine decades would increase all those impacts similarily attributable to the proposed action. Implementation of this alternative would result in a number of unavoidable adverse impacts to visually sensitive areas which would have been protected in the proposed action.

8.7.10 Noise

Noise intrusiveness would be much more severe during the first nine decades than under the proposed action.

8.7.11 Human Health

The 1970 allowable cut plan did not include use of herbicides and there has been no use of herbicides

to date for timber management. Continuation of this practice would avoid any possible adverse impacts from herbicide application.

8.7.12 Socioeconomic Conditions

8.7.12.1 Impacts on Annual Timber Sales

Annual timber sales exceed that of the proposed action by 42 percent in the first decade and 55 percent for the subsequent eight decades. Total sales for the timbershed will be increased by 5 percent above the proposed action until the tenth decade. Then sales would be perpetually 7.5 percent less than with the proposed action, which is an approximate 1 percent decline for the timbershed.

8.7.12.2 Impacts on Employment and Personal Income

Direct local employment dependent on harvest and forest development practices during the first decade would be 227 local jobs more than for the proposed action, and a 26-job increase in pulp and paper processing elsewhere in Oregon. For the long-term equilibrium, comparable impacts would be 75 less.

Total Josephine County jobs (208) as compared to those attributable to the proposal would be an 1.2 percent supplement to total employment in Josephine County during the first decade: in the long term the same difference would become -113 and represent a reduction of 0.5 percent of total Josephine County employment during that period.

During the first decade, and compared to that of the proposed action, community personal income would increase by $7.8 million, 1 percent of total personal earnings in Josephine, Jackson and Douglas Counties during 1974.

8.7.12.3 Local Public Finance

During the first decade, annual O&C payment to all counties, again compared to the proposed action would increase by $3 million, which would represent $0.09 in property tax rate equivalence (based on 1977 assessed valuation). For southwest Oregon counties, O&C payments attributable to the JSYU would increase by $1.9 million. For Josephine and Douglas County the O&C payment and property tax rate equivalence would change by: $400 thousand and $0.50; and $0.8 million and $0.42, respectively.

8.7.13 Energy Usage

Total energy consumption attributable to the alternative would be approximately 1.724 trillion Btu's. Road items are the same as the proposal. Log production would increase by 37 percent and planting greatly decrease. Slash burning, use of herbicides, fertilization and precommercial thinning would be eliminated.

Energy use would be 29 percent greater than that associated with the proposal.

8.7.14 Land Use

Lands which are currently included in the timber management category would remain in that category and would be subject to harvest.

O&C lands suitable for sustained yield timber management with possible wilderness and/or primitive values would be harvested. No opportunity for study of the feasibility for designation would be available. However, this is not a change from the proposed action.

Table 8-6

Comparison of Short Term Impacts for Major Resource Components
Proposed Action and Selected Alternatives

Environmental Components Impacted	Unit of Measure	Existing Situation	Proposed Action	Alternatives No. 1	No. 3	No. 4	No. 5	No. 6	No. 7	Remarks/Assumptions
				As Compared to Proposed Action						
Climate										
Losses Due to Windthrow	bd.ft./ac./year	13.8	10.0	-2.9	-1.6	+0.5	+2.3	-0.3	+3.8	Amounts are stongly influenced by storms
Air Quality										
Particulate Pollution Due to Operation of Internal Combustion Engines:										
Nitrogen Oxides	tons/yr.	201	141	-40	-23	+8	+32	-5	+60	Amounts are qualitative and should be compared accordingly
Sulfur Oxides	tons/yr.	6.5	4.7	-1.3	-0.8	+0.3	+1.1	-0.2	+1.8	
Carbon Monoxide	tons/yr.	731	513.2	-147	-83	+27.3	+116	-16.6	+218	
Particulates	tons/yr.	12.0	8.4	-2.4	-1.4	+0.4	+1.9	-0.3	+20.4	
Particulate Pollution Due to Smoke	tons/cubic mi.	0	0.101	-0.032	-0.014	+0.006	+0.008	-0.003	-0.101	Amounts are compared to totals for SW Oregon
Voltilization of Herbicide										
Diesel Oil Carrier	Gal.	0	20,000	-20,000	-7,500	+1,627	+3,832	-800	-20,000	Based on a set of ideal constant environmental conditions during application; amounts are qualitative
Silvex (2,4,5-TP)	lb.	0	1,088	-1,088	-408	+88	+208	-44	-1,088	
2,4-D	lb.	0	1,088	-1,088	-408	+88	+208	-44	-1,088	
Roundup	lb.	0	763	-763	-286	+62	+146	-30	-763	
Krenite	lb.	0	763	-763	-286	+62	+146	-30	-763	
Atrazine	lb.	0	3,200	-3,200	-1,200	+260	+613	-128	-3,200	
Dalapon	lb.	0	3,300	-3,300	-1,238	+269	+613	-132	-3,300	
Soils										
Nutrient Losses:										
Nitrogen	lb.	184,021	129,194	-37,023	-20.890	+6,877	+29,117	-4,178	+54,827	Calculated from experimental forest results
Phosphorus	lb.	54,918	38,556	-10,049	-6,234	+2,052	+8,689	-1,247	+16,362	
Potassium	lb.	94,200	66,134	-18,952	-10,693	+3,521	+14,905	-2,139	+28,066	
Calcium & Magnesium	lb.	355,646	249,685	-71,552	-40,372	+13,292	+56,272	-8,074	+105,961	
Surface Disturbance	acres	21,577	19,637	-5,263	-3,849	+1,598	+3,762	-635	+1,940	Estim. based on research data
Soil Compaction	acres	13,608	12,384	-3,319	-2,427	+1,008	+2,773	-400	+1,224	Estim. based on research data
Erosion Due to Tractor Yarding	tons	4,038	2,835	-812	-458	+150	+639	-92	+1,203	Estim. based on research data
Erosion Due to Cable Yarding	tons	385	270	-77	-44	+14	+61	-9	+115	Estim. based on research data
Erosion Due to Road Constuction	tons	166,300	166,300	no change	no change	no change	no change	no change	0	Estim. based on research data

Table 8-6 (Continued)

Comparison of Short Term Impacts for Major Resource Components
Proposed Action and Selected Alternatives

Environmental Components Impacted	Unit of Measure	Existing Situation	Proposed Action	Alternatives No. 1	No. 3	No. 4	No. 5	No. 6	No. 7	Remarks/Assumptions
				As Compared to Proposed Action						
Erosion Due to Recon- struction & Maintenance	tons	7,500	7,500	no change	no change	no change	no change	no change	no change	A constant environmental cost of road maintenance
Herbicides Entering the Soil Ecosystem:										
Silvex (2,4,5-TP)	lb.	0	5,115	-5,115	-1,646	+416	+343	-205	-5,115	Amounts are estimates and should be compared quali- tatively
2,4-D	lb.	0	6,135	-6,135	-1,999	+499	+412	-245	-6,135	
Roundup	lb.	0	2,580	-2,580	-312	+210	+173	-103	-2,580	
Krenite	lb.	0	3,035	-3,035	-366	+247	+2	-121	-3,035	
Atrazine	lb.	0	29,200	-29,200	-4,648	+2,376	+1,959	-1,168	-29,200	
Dalapon	lb.	0	27,830	-27,830	-6,792	+2,265	+1,867	-1,113	-27,830	
Diesel Oil Carrier	gal.	0	83,400	-83,400	-74,234	no change	+64,960	-3,336	-83,400	
Water Resources										
Water Quality	tons sedi- ment yield	837,062	747,839	-66,424	-66,424	+12.342	+52,238	-7,493	89,223	
Water Yield	acre feet	66,598	43,193	-11,264	-11,264	+2,092	+8,858	-1,270	+23,405	
Terrestrial Vegetation										
Death of Commerical Trees	trees/decade	228,000	160,000	-46,000	-25,000	+10,000	+16,500	-6,400	+68,000	Number of trees based on volume/tree
Initiation of Secondary Succession	acres	65,600	55,000	-16,000	-7,200	+2,800	+3,650	-1,800	+10,600	Acreage based on Ac. harvested
Elimination of Mature Communities	acres	0	6,800	-2,200	-1,000	+391	-7,500	-272	-6,800	
Elimination of Old-Growth Communities	acres	44,000	27,000	-8,400	-3,800	+1,500	+10,600	-1,080	+17,000	
Alteration of Community Longevity	max. age attainable	80	80	no change	no change	no change	no change	no change	no change	Assumes maximum commercial age = 80
Destruction of Surface vegetation	acres	13,300	25,400	-11,000	-12,200	-6,100	-6,400	-1,016	-12,100	Increase is indication of higher intensity mgmt.
Alteration of Plant habitat	acres	65,600	55,000	-16,000	-7,200	+2,800	+3,650	-1,800	+10,600	

Table 8-6 (Continued)

Comparison of Short Term Impacts for Major Resource Components
Proposed Action and Selected Alternatives

Environmental Components Impacted	Unit of Measure	Existing Situation	Proposed Action	Alternatives No. 1	No. 3	No. 4	No. 5	No. 6	No. 7	Remarks/Assumptions
				As Compared to Proposed Action						
Complete Elimination of Plant Habitat	acres	4,340	4,340	no change	no change	no change	no change	no change	no change	Equal to the acreage occupied by roads
Change in Community Structure	acres	65,600	55,000	-16,000	-7,200	+2,800	+3,650	-1,800	+10,600	Based on acreage harvested
Seral Truncation	years	1	1	no change	no change	no change	no change	no change	no change	Impact tied mainly to planting and development
Herbicide-Induced Reduction of Non-conifer Productivity	acres	0	47,700	-47,700	-18,100	+2,400	+3,650	-1,500	-47,700	
Increased Productivity for Conifers	% increase	unknown	unknown	unknown	unknown	unknown	unknown	unknown	unknown	Impact tied to proposed development practices & stand regulation
Destruction of Endangered Species	No. species	unknown	unknown	less	less	greater	greater	less	greater	
Herbicide-Induced Mutagenesis	No. species impacted	none	unknown	none	less	more	more	less	none	
<u>Aquatic Vegetation</u>										
Plant Habitat Displacement from Bridges	perennial stream mi.	7.2	7.2	no change	no change	no change	no change	no change	no change	
and Culverts	Intermittent stream mi.	10.7	10.7	no change	no change	no change	no change	no change	no change	
Other Community Changes	—	unknown	unknown	unknown	unknown	unknown	unknown	unknown	unknown	
<u>Terrestrial Animals</u>										
Increase in Early Seral Habitat	acres	73,500	67,200	-19,250	-10,850	+3,600	15,150	-2,150	+6,300	
Truncation of Seral Habitat	Affect on animals	unknown	unknown	unknown	unknown	unknown	unknown	unknown	unknown	Impact tied to planting and development practices
Decrease in Mature & Old-Growth Habitat	acres	44,300	33,400	-16,100	-7,000	+3,100	+4,000	-1,350	10,900	
Small Mammals Benefitted by Seral Changes	% species Table 2-11	14	14	no change	no change	no change	no change	no change	no change	Table 2-11 not inclusive of all species in JSYU
Small Mammals Unaffected by Seral Changes	% species Table 2-11	65	65	no change	no change	no change	no change	no change	no change	

Table 8-6 (Continued)

Comparison of Short Term Impacts for Major Resource Components
Proposed Action and Selected Alternatives

Environmental Components Impacted	Unit of Measure	Existing Situation	Proposed Action	Alternatives No. 1	No. 3	No. 4	No. 5	No. 6	No. 7	Remarks/Assumptions
				As Compared to Proposed Action						
Small Mammals Adversely Affected by Seral Changes	Table 2-11	21	21	no change	no change	no change	no change	no change	no change	
Non-Game Birds Benefit-ted by Seral Changes	% species Table 2-12	24	24	no change	no change	no change	no change	no change	no change	Table 2-12 not inclusive of all species in JSYU
Non-game Birds Unaffect-ed by Seral Changes	% species Table 2-12	48	48	no change	no change	no change	no change	no change	no change	
Non-Game Birds Adversely Affected by Seral Changes	% species Table 2-12	28	28	no change	no change	no change	no change	no change	no change	
Enhanced Potential Deer Carrying Capacity	acres	73,500	67,200	-16,100	-7,000	+3,100	+4,000	-2,700	+6,300	Based on acreage harvested & natural successional changes over 10 years
Enhanced Potential Elk Use	acres	73,500	67,200	-16,100	-7,000	+3,100	+4,000	-2,700	+6,300	Same as above
Enchanced Potential Blue Grouse & Mountain Quail Habitat	acres	73,500	67,200	-16,100	-7,000	+3,100	+4,000	-2,700	+6,300	Same as above
Changes in Invertebrate Diversity	diversity index	unknown	unknown	unknown	unknown	unknown	unknown	unknown	unknown	
Decline in Potential Spotted Owl Habitat	acres	44,300	33,400	-16,100	-7,000	+3,100	+4,000	-1,350	+6,300	Based on elimination of mature and old growth communities
Impacts to Reptiles & Amphibians	no. species impacted	unknown	unknown	unknown	unknown	unknown	unknown	unknown	unknown	
Increases in Animal Stress	no. species susceptible	unknown	unknown	unknown	unknown	unknown	unknown	unknown	unknown	
Permanent Displacement of Habitat	acres	4,340	4,340	no change	no change	no change	no change	no change	no change	Equal to the acreage displaced by roads
Lethal Exposure to Herbicides	no. animals	0	unknown	none	unknown	unknown	unknown	unknown	none	
TCDD Bioaccumulation	no. animals	0	unknown	none	unknown	unknown	unknown	unknown	none	
Herbicide Carrier Toxicity	no. animals affected	0	unknown	none	unknown	unknown	unknown	unknown	none	
Aquatic Animals										
Physical Habitat Alterations	stream mi.	unknown	unknown	unknown	unknown	unknown	unknown	unknown	unknown	

Table 8-6 (Continued)

Comparison of Short Term Impacts for Major Resource Components
Proposed Action and Selected Alternatives

Environmental Components Impacted	Unit of Measure	Existing Situation	Proposed Action	Alternatives As Compared to Proposed Action No. 1	No. 3	No. 4	No. 5	No. 6	No. 7	Remarks/Assumptions
Biological Habitat										
Alterations	stream mi.	unknown	unknown	unknown	unknown	unknown	unknown	unknown	unknown	
Mechanical Displacement of Physical Habitat by Structures	stream mi.	7.2	7.2	no change	no change	no change	no change	no change	no change	Equal to the number of stream miles occupied by culverts
Toxic TCDD Dosage	no. fishes affected	0	unknown	none	unknown	unknown	unknown	unknown	none	
TCDD Bioaccumulation	no. species susceptible	0	unknown	none	unknown	unknown	unknown	unknown	none	
Fertilizer-Induced Nutrient Enrichment	stream miles affected	0	unknown	unknown	none	unknown	unknown	unknown	none	
<u>Cultural Resources</u>										
Damage to Unidentified Cultural Resource Sites 1/	expected degree of damage and knowledge lost	+5	+2	+2	+1	+3	+4	+2	+5	
Site Accessibility and Resultant Vandalism and/or Destruction 1/	state of accessibility	+3	+2	+3	+3	+3	+3	+2	+3	
<u>Visual Resources</u>										
Creation of Visual Contrast 1/	contrasts created	+5	+3	+2	+2	+4	+4	+3	+5	
<u>Recreation</u>										
Decreased Quality of Recreation Experience 1/	loss of opportunity to achieve desired experiences or expected consequences.	+5	+2	+3	+1	+3	+4	+2	+5	
Hazardous Conditions for Recreationists 1/	state of activities endangering recreationists.	+5	+3	+2	+3	+3	+4	+3	+5	
Hunting use 2/	hunter days	23,050	35,450	no change	no change	+3,050	+6,100	-500	+11,260	Based upon yearly average 1970-1975

Table 8-6 (Continued)

Comparison of Short Term Impacts for Major Resource Components
Proposed Action and Selected Alternatives

Environmental Components Impacted	Unit of Measure	Existing Situation	Proposed Action	Alternatives No. 1	No. 3	No. 4	No. 5	No. 6	No. 7	Remarks/Assumptions
				As Compared to Proposed Action						
Camping Use (Non-Rogue) 2/	visitor days	9,800	13,510	No Change	No Change	+990	+2,200	+500	+4,330	Based upon FY 1974 Use Data
ORV Use 2/	visitor days	16,300	21,240	No Change	No Change	+2,260	+4,150	no change	+6,880	Based upon FY 1974 Estimated Use Data
General Sightseeing Use 2/	visitor days	217,300	491,360	-41,360	-41,360	-26,360	-67,830	no change	-95,870	Based upon 1974 Use Data
Fishing Use 2/	visitor days	12,100	20,570	+1,930	+2,430	-2,570	-5,600	no change	-9,760	Based upon 1976 Estimated Use Data
Miscellaneous Use 2,3/	visitor days	8,500	18,165	-1,665	-1,665	-2,665	-3,500	+500	-3,545	Based upon 1976 Estimated Use Data
Destruction of Small, Undeveloped Pristine Areas	acreage harvested	32,800	27,500	-8,000	-3,500	+1,550	+1,935	-900	+5,300	Based upon the assumption that each year 50% of the cut will be on new, previously undisturbed, ground.
Noise										
Noise Intrusiveness 1/	degree	+5	+2	+1	+1	+3	+4	+1	+5	
Socioeconomic 4/										
Annual JSYU Timber Sold	MM bd.ft.	146	103	-30	-17	+5	+20	-4	+43	For existing situation data are based on actual harvest during 1973-74-75 (average)
Timber Supply - Medford Timbershed	MM bd.ft.	555	578	-22	-12	+3	+18	-3	+29	Based on Bueter projections for Jackson & Josephine Co. - 1973-74-75 is actual harvest.
Josephine Co. - JSYU - Related Jobs	jobs	942	800	-225	-139	+38	+143	-26	+208	Total (direct & indirect) employment attributed to JSYU timber harvest and forest development.
Percent of All Josephine Co. Jobs	percent	6.2%	4.4%	-2.5%	-0.8%	+0.3%	+0.8%	-0.3%	+1.2%	Josephine Co. - JSYU - Related jobs divided by total historic or projected employment.
All JSYU Timber Related Jobs	jobs	1,799	1,421	-407	-242	+67	+265	-56	+459	Includes Josephine Co., Douglas Co., and Jackson Co. Coarse residue related employment is elsewhere in Oregon.

Table 8-6 (Continued)

Comparison of Short Term Impacts for Major Resource Components
Proposed Action and Selected Alternatives

Environmental Components Impacted	Unit of Measure	Existing Situation	Proposed Action	Alternatives No. 1	No. 3	No. 4	No. 5	No. 6	No. 7	Remarks/Assumptions
				As Compared to Proposed Action						
Local Personal Income	$ Million	27.7	22.7	-6.6	-3.9	+1.0	+4.4	-0.9	+7.8	Income relationships are based on 1974 relationships and price levels.
Local Population	1,000 persons	4.6	3.7	-0.9	-0.6	+0.2	+0.2	-0.2	+1.1	Local jobs x 2.86
O&C Payments - JSYU	$ Million	4.9	7.9	-2.3	-1.3	+0.3	+1.5	-0.3	+3.0	Based on average stumpage price /MBF existing or projected for years of harvest: 1973-74-75, $77/MBF; Proposal $154/MBF.
Property Tax Rate Equivalence of O&C Payments:										
O&C Area		0.20	0.23	-0.06	-0.04	+0.01	+0.04	-0.01	+0.09	O&C payments divided by assessed value of property within county.
Josephine		1.25	1.43	-0.42	-0.25	+0.04	+0.27	-0.05	+0.50	
Douglas		0.90	1.11	-0.31	-0.19	+0.06	+0.21	-0.04	+0.42	
Jackson		0.65	0.75	-0.21	-0.12	+0.04	+0.06	-0.01	+0.28	
Energy Usage	Trillion BTU's	1.724	1.308	-0.361	-0.216	-0.059	+0.264	-0.058	+0.416	

Footnotes:

1/ In the case of unknown variables, numerical weights of 1 to 5 have been assigned to impacts to present comparability between impacts of the proposed and alternative actions. These weightings are not proportional ratings, but merely represent degrees of adverse impact with a weight of 5 representing the alternative from which the most impact will accrue.

2/ 1990 demand projections are based upon a high estimate that demand will increase by 103% over 1970 demand. Visitor day and hunter day analyses are based upon professional judgement as to how impacts discussed in the narrative will affect recreational activities. Because of the range which these projections could take, they are not absolute and have been presented for comparability only. They are also presented as worst case situations.

3/ Includes snow play, collecting, sightseeing other than general sightseeing (historical, botanical, wildlife, geological), incidental hiking, camping, and picnicking in underdeveloped areas.

4/ Socioeconomic Variables - For additional detail on interpretation or estimating procedure, see Section 3.3.2.

Table 8-7
Comparison of Alternatives to Proposed Action in
Relation to Statewide (LCDC) Goals

LCDC GOALS	1 No Vegetation Control	2 No Silvex	3 Limited Investment	4 Surplus Inventory	5 Forestry Program	6 Zane Grey Wilderness	7 No Action
I. Citizen involvement	0	0	0	0	0	0	0
II. Land use planning	0	0	0	0	0	0	0
III. Preserve agricultural lands	0	0	0	0	0	0	0
IV. Conserve forest lands 1/	0	0	0	0	0	0	0
V. Protect natural resources	+	+	+	-	-	++	--
VI. Improve air & water quality	+	+	++	-	-	+	--
VII. Protect life & property from natural disasters	0	0	0	0	0	0	--
VIII. Satisfy recreation needs	0	0	0	0	0	+	-
IX. Diversify & improve economy 2/	-	0	--	+	--	-	-
X. Provide for housing needs 2/	-	0	--	+	--	-	-
XI. Plan & develop public facilities	0	0	0	0	0	0	0
XII. Provide transportation system	0	0	0	0	0	-	+
XIII. Conserve energy	+	--	++	-	-	0	0
XIV. Establish urban growth boundary	0	0	0	0	0	0	0

- slightly less compatible + slightly more compatible
-- substantially less compatible ++ substantially more compatible
0 same

1/ No value judgment comparison of compatibility with goal IV was considered appropriate; the goal itself does not rank the various forest uses.

2/ In comparing with goals IX and X, the paramount consideration was economic stability and sustained timber supply. Second was the level of the sustainable timber harvest.

9. CONSULTATION AND COORDINATION

From the very beginning of the planning effort in the Josephine Sustained Yield Unit, BLM's Medford District sought public input through various means as outlined below. A full record of all public participation is available for review in the Medford District Office.

The Medford District made contact related to development of the management framework plan with local groups and officials. Public meetings and workshops were held and field tours conducted. Primary documents utilized in writing the environmental statement were the planning systems sections prepared in the Medford District which reflected the public participation received.

Public media, government and private agencies, industrial groups and others were the recipients of several information documents dealing with the draft statement. These included correspondence, news releases and copies of the preparation plan.

In all, exclusive of the media, some 500 others were kept informed of the progress on the management framework plan, timber management plan and draft environmental statement for the JSYU.

9.1 COORDINATION IN REVIEW OF DRAFT STATEMENT

Comments on the draft environmental statement were requested from:

Federal Agencies

Advisory Council on Historic Preservation*
Department of Agriculture
    Forest Service*
    Soil Conservation Service
Department of Commerce
    National Marine Fishery Service
Department of Defense
    U.S. Army Corps of Engineers*
Department of Energy
    Bonneville Power Administration*
    Region X*
Department of the Interior
    Fish and Wildlife Service*
    Geological Survey*
    Heritage Conservation and Recreation Service*
    Bureau of Mines
    Bureau of Reclamation*
Department of Transportation
    Federal Highway Administration
Environmental Protection Agency*
Small Business Administration

State and Local Government

Oregon State Clearinghouse*
Oregon State Historic Preservation Officer*
Rogue Valley Council of Governments (Regional Clearinghouse)*
Boards of County Commissioners
    Coos County
    Curry County
    Douglas County
    Jackson County
    Josephine County*

Interest Groups

Ada County (Idaho) Fish and Game League
American Association of Range Management
American Forest Institute
Associated Oregon Industries
Association of O&C Counties*
Federation of Outdoor Clubs - Oregon
CHEC*
Friends of the Earth
Headwaters Association*
Industrial Forestry Association*
Izaak Walton League*
Jackson County Stockmen's Association*
Josephine Conservation Coalition
League of Women Voters
National Resource Defense Council*
National Wildlife Federation
Oregon Cattlemen's Association
Oregon Council of Rock and Mineral Clubs*
Oregon Environmental Council
Oregon Forest Protection Association
Oregon Natural Heritage Program*
Oregon Student Public Interest Research Group
Northwest Timber Association*
Pacific Northwest Four-Wheel Drive Association
Rogue River Legal Action Committee
Rogue Valley Bird Fanciers
Rogue Valley Guides Association
Sierra Club
Society of American Foresters
Southern Oregon Resource Alliance
Southern Oregon Timber Industries Association
The Wilderness Society*
Western Forest Industry Association*
Wildlife Management Institute*

* Agencies and organizations which prepared written responses to the draft statement.

9.2 PUBLIC COMMENTS AND RESPONSES

The Notice of Availability of the draft statement was published in the March 8, 1978, issue of the Federal Register on page 9540. An amended notice was published in the April 5, 1978, issue of the Federal Register on page 14364. The amended notice announced a 45-day public review and comment period. The March 8, 1978, notice included a schedule of public hearings on the draft statement which were held in Grants Pass and Salem, Oregon. After publication of the notice of availability, over 500 copies of the draft statement were mailed to Federal, State, and local government agencies, nongovernment organizations such as conservation groups, and private individuals for their review and comment.

Reading copies were made available for public review at the Office of the State Director, Bureau of Land Management, Portland, Oregon; Medford District Office, Bureau of Land Management, Medford, Oregon; Medford District, Grants Pass Information Office, Grants Pass, Oregon; and the Office of Public Affairs, Bureau of Land Management, Washington, DC. Copies were also placed in nine public libraries in western Oregon.

In addition, a news release of March 7, 1978, from the Oregon State Office, Bureau of Land Management, was sent to 22 daily newspapers, 54 weekly newspapers, 55 periodicals, 2 news services, and 221 interest groups announcing the availability of the draft statement.

9.3 PUBLIC HEARINGS

The Bureau of Land Management held two public hearings on the adequacy of the Draft Statement on April 10 and 13, 1978. An Interior Department Administrative Law Judge presided over the April 10 hearing at Grants Pass, Oregon. A Bureau of Land Management Oregon State Office official presided over the April 13 hearing at Salem, Oregon. Both hearings were recorded verbatim by a professional court reporter.

9.4 HANDLING AND REVIEW PROCEDURES FOR PUBLIC COMMENTS

Copies of all written comments and the hearing transcripts are available for public review at the State Director's Office, Bureau of Land Management, 729 N.E. Oregon Street, Portland, Oregon.

All letters received and hearings testimony were reviewed and considered. Comments which presented new data, questioned facts and/or analyses, or raised questions or issues bearing directly upon the environmental effects of the proposed action, were used in revising the text or are responded to separately.

9.5 COMMENTS AND RESPONSES

Each person who testified at the hearings and each person, organization, or agency that provided written submissions was assigned an index number. Substantive comments from the hearings and written submissions are listed by related section (e.g., Vegetation, Animals) with the index number following the reference to the comment. Similar comments received from more than one source have two or more index numbers identifying the source.

Changes incorporated into the final statement are identified in the responses.

9.5.1 Public Hearing Testimony

Grants Pass, Oregon

Index Number	Speaker	Representing
G- 1	William Sutliff	Rogue Gem & Geology Club
G- 2	Jack L. Bolding	Self
G- 3	Mrs. Hugh R. Haddock	Shan Creek Grange
G- 4	John L. Smith	Industrial Forestry Association

Index Number	Speaker	Representing
G- 5	Jim Geisinger	Douglas Timber Operators
G- 6	Dennis Hayward	Northwest Timber Association
G- 7	Alan Winter	Self
G- 8	Lawrence Brown	Josephine County Commissioners
G- 9	Steve Jole	Self
G-10	Paula Downing	Headwaters Association
G-11	Bill Newby	Self
G-12	Ann Basker	Southern Oregon Resources Alliance
G-13	Martin Crane	Southern Oregon Timber Industries Assn.
G-14	William Meyer	Self
G-15	Mark Lenetsky	Josephine County Food Center
G-16	David Erion	Rogue Group, Sierra Club
G-17	Boyd Peters	Self
G-18	Carl Wittman	Self
G-19	Ms. LaRose	Self
G-20	David McCoy	Self
G-21	James Kalfas	Self
G-22	William Biggs	Josephine Conservationists
G-23	Walter Lindley	Self
G-24	Conny Lindley	Self
G-25	Murray Lewis	Self
G-26	Buck Mehl	Robert Dollar Co. & Glenwood Plywood
G-27	John Davenport	Western Forest Industries Association
G-28	James McCoy	Earth Sing Natural Foods Restaurant & Mahonia Holistic Health Center
G-29	George Calvert	Commissioner - Josephine County
G-30	Ray Doerner	Association of O&C Counties
G-31	Ogden Kellogg, Jr.	Self

Salem, Oregon

Index Number	Speaker	Representing
S-1	Andy Kerr	Oregon Student Public Interest Research Group
S-2	Mike Beyerle	Oregon State Department of Forestry
S-3	Paul J. Zinke	Self

9.5.2 Letters Received

Letter Number	Agency, Organization, or Individual
1	Bret W. Stafford
2	Douglas Timber Operators, Inc.
3	Northwest Timber Association
4	USDI, Heritage Conservation & Recreation Service
5	Izaak Walton League of America
6	Oregon Natural Heritage Program
7	Bonneville Power Administration
8	Shan Creek Grange #794
9	CHEC (R. O'Toole)
10	The Robert Dollar Company
11	Herbert Lumber Company
12	Arthur Brown
13	U.S. Environmental Protection Agency, Region X
14	Sun Studs, Inc.
15	Roseburg Lumber Company
16	R.E. Klusman
17	Oregon Council of Rock & Mineral Clubs
18	C.C.D. Economic Improvement Association
19	D.R. Johnson Lumber Company
20	The Wilderness Society
21	Wildlife Management Institute
22	Department of the Army, Corps of Engineers
23	Dr. Paul Zinke
24	Malcolm Drake
25	A. Winter
26	Headwaters Association (Paula Downing)
27	Association of O&C Counties
28	Industrial Forestry Association
29	U.S. Forest Service, Region 6
30	Southern Oregon Citizens Against Toxic Sprays
31	Phyllis Cribby
32	John A. Carnegie
33	Clarence Pruess, Jr.
34	C&D Lumber Co.
35	Josephine County
36	Western Forest Industries Association
37	Oregon Department of Forestry
38	Oregon Intergovernmental Relations Divison
39	USDI, Fish & Wildlife Service
40	Rogue Valley Council of Governments
41	Connie Findley
42	Boyd Peters
43	U.S. Department of Energy, Region X
44	Jackson County Stockman's Association
45	Natural Resource Defense Council, Inc.

Letter Number	Agency, Organization, or Individual
46	USDI, Bureau of Reclamation
47	Phyllis Cribby
48	Advisory Council on Historic Preservation
49	Linda D. Bernhardt
50	PACKRAT (J. Gordon)
51	Oregon Department of Fish & Wildlife - Southwest Regional Office
52	P. Tangible
53	USDI, Geological Survey

All letters received, with the exception of 19 that did not contain comments relative to the draft statement, are printed as Appendix M.

9.5.3 Table of Contents for Comments and Responses

9.5.3.1 COMMENTS ON THE PROPOSAL

1. Comment: The draft ES is inadequate because the proposed plan is described in generalities, and does not give the reader complete information as to specific actions that will be taken, the location for implementing these actions, and the sequence of these events.

Commentator: 45

Response: Specificity of location for harvest, road construction, intensive forest development practice, etc., is a function of annual or multi-year planning. Appendices A and B provide examples of an annual timber sale plan and an annual herbicide plan to illustrate the process. A regional ES such as this is designed to surface general issues and concerns which are then the basis for specific environmental assessments prepared on each subsequent action. In accordance with the latest draft CEQ regulations, where proposal specifics were not known, worst case and most probable case scenarios were assessed.

Section 1.6 explains that any "typical sequence" would only be illustrative. The actual sequence of treatments for a given tract is guided by TPCC and OI. On-site analysis of treatment needs by various specialists during the project development phase determine the specific aspects of each treatment to be utilized.

2. Comment: The authors of the DES conclude that total removal of old growth timber from high intensity lands is a highly significant impact. Old growth is an invaluable source of time and site-tested species for scientific research and for actual regeneration of superior varieties. It is also of great importance in habitat and watershed protection and has inestimable recreation and esthetic value.

Commentator: G-14, G-16; 30,45

Response: It is openly recognized that conversion of old growth timber stands to earlier seral stages carries certain impacts. Impacts would be concentrated on high intensity lands which are managed for sustained yield timber production (Section 1.1) and to a lesser extent on low intensity lands where trial harvest is proposed in the first decade. To infer that all old growth timber would be removed from the JSYU is erroneous. Table 1-5 shows old growth timber which would remain due to land use allocations proposed in the MFP.

3. Comment: Why was the allowable cut computed in cubic feet rather than board feet when it is known that the ratio between the two measurements changes depending on tree size.

Commentator: 9,30

Response: It is true that the ratio of board feet to cubic feet varies by the size and type of timber.

By policy, BLM must project a level of timber output into the future with no planned reductions. For accuracy, allowable cut is computed and projected into the future on the basis of cubic feet. Since board feet Scribner is expected to remain the industry standard for the coming decade, the decadal allowable cut is converted to Scribner board foot equivalents, based on the age and size of timber expected to be included in sales during the decade. See Section 1.5.2.

4. Comment: What is the rationale of a two-stage shelterwood silvicultural system instead of the three-stage shelterwood presently in use?

Commentator: 9,15,25,32,45

Response: The silvicultural objective of shelterwood management is to create an environment for establishing regeneration.

The preparatory, or first, stage of a three-stage shelterwood has shown no value for regeneration. In fact, this initial cut as practiced in the Josephine SYU in the past has been detrimental to regeneration establishment. The old growth stands have been opened enough to stimulate grass and brush species, which are the primary competitors with seedlings for light and moisture, but not enough for seedling establishment. The first stage of a two-stage shelterwood immediately prepares the stand for regeneration, providing new seedlings the best opportunity for survival.

5. Comment: It is assumed that the Chapter 1 description of the regeneration cut of shelterwood harvests refers to basal area when stating that up to 60 percent of the original stand will be removed.

Commentator: 28

Response: The 60 percent level refers to basal area. See Section 1.6.2.1.

6. Comment: If 36,000 acres are to receive the regeneration cut of a two-stage system, it would appear that 18,000 acres would be available for final harvest cut during the second 5 years rather than the 9,000 acres indicated in Table 1-1.

Commentator: 32

Response: It is possible that 18,000 acres could be available for final harvest cut during the decade. However, other factors such as priority for harvest over all portions of the JSYU dictated a commitment to the lesser figure.

7. Comment: The amount of trial harvest proposed appears excessive in light of the fact that at present the regeneration period on low intensity lands is unknown except that it exceeds 5 years.

Commentator: G-7; 9,30,45

Response: The objective for trial harvest, proposed for the first decade only, is to gather data on the actual regeneration period and determine what practices might be effective to facilitate regeneration within 5 years. Design of research to this end (see Section 1.7.2) requires replicates of control (untreated) and various treatments under different soil and site conditions to gain the required knowledge. It is not felt that the acreage involved is excessive when compared with the management knowledge sought.

8. Comment: The proposal for trial harvest from low intensity lands deals with two-stage shelterwood harvest and natural regeneration, with possible herbicide site preparation in good seed years. For it to be a beneficial experimental program, the full range of intensive forest management practices should be tested on these lands.

Commentator: G-5,G-6,G-8; 3,5,19,25

Response: The reason this experimental program is being proposed is the uncertainty regarding how long it takes to adequately regenerate an area. This is the first question that must be answered. The emergance of the Forestry Intensified Research (FIR) plan provides a program to study a more complete range of intensive management practices. Section 1.2.2 reflects this interaction.

9. Comment: I question your implication that the only benefit of slash burning is to make the site available for hand planting. Is burning beneficial in preparing a seed bed as well as controlling some types of competition?

Commentator: 3

Response: Implicit in the description of slash burning and planting crew access is the improved condition of the site with more tree planting or seeding locations exposed and a reduction in competitive vegetation. Section 1.6.3.1 has been modified.

10. Comment: The discussion of herbicide use should be reduced to a brief description of the proposed program rather than analyzing it in context with the overall timber management plan.

Commentator: 13,29,30

Response: Although an environmental statement specific to the BLM herbicide program in western Oregon is being prepared, it will not be ready in time to meet the court ordered deadline for completion of the Josephine statement. Should any different decisions arise from the herbicide environmental statement, Josephine timber management decisions will be reconsidered.

11. Comment: The proposal finds use of genetically superior seed and planting stock to be improbable within the 20-year planning horizon. Sufficient genetically improved material, especially blister rust resistant sugar pine, should be available to meet as least a portion of the reforestion needs and appropriate credit should be taken in the allowable cut computation.

Commentator: 29

Response: Most, if not all, of the projected sugar pine reforestation (10 percent) will employ blister rust resistant seed or stock. Increased growth, however, is not yet a sugar pine genetic factor.

While some genetically superior Douglas-fir stock suitable to the JSYU will be available within the planning horizon, the amount is unknown. Extensive field tests and outplanting can be anticipated. However, the conservative approach was deemed appropriate in the face of unknowns and no credit for genetic stock was programmed into allowable cut computations.

12. Comment: Projected shortages of nursery stock for planting during the next decade may make reforestation targets difficult to achieve.

Commentator: 29

Response: Plans are currently being formulated by Federal, State, and private organizations with the Bureau's cooperation to alleviate this projected shortage.

13. Comment: If sustained yield at the proposed level is to be attained, reforestation must be successfully accomplished. What is the experienced rate of plantation success in the JSYU?

Commentator: 8,9,13,30

Response: Experience in the JSYU with planting seedlings under shelterwood management is limited. Attempts to achieve natural regeneration with a

three-stage shelterwood approach, however, indicate little or no results after more than 10 years of relying on natural seeding.

Responsible forest management dictates establishing a new forest as quickly as possible following harvest of old growth timber. The Rogue River and Siskiyou National Forests have been underplanting shelterwood harvested areas for 5 to 6 years with significant success. Limited Medford District experience during the past 2 years shows success where underplanting has been conducted.

14. Comment: BLM proposes to fertilize 22,300 acres and estimates a 22 percent gain in growth from this treatment. What studies support this response estimate and what extrapolation was involved to equate the studies with JSYU soils and conditions?

Commentator: G-7,G-8; 9,30,45

Response: The proposal involves the planned fertilization of 18,900 acres during the upcoming decade (see Table 1-1).

Most studies relating to the effects of forest fertilization are concerned with locations receiving more than 35 inches of annual rainfall. Approximately 210,000 acres, or about 92 percent of the high intensity lands, meet this basic criterion.

The Soil Inventory of the Medford District was used to stratify the lands into three basic categories, namely:

- lands on southerly and westerly aspects receiving more than 35 inches annual precipitation.
- lands on northerly and easterly aspects receiving more than 35 inches annual precipitation.
- lands on northerly and easterly aspects receiving less than 35 inches annual precipitation.

An estimate of the response of each category to fertilization was made based on available data. The differences in response by category varied from 15 percent to 30 percent. A weighted average based on the occurrence of the various categories on BLM lands in the Josephine SYU was computed to be 22 percent.

15. Comment: It would be useful to the reader to have a table or chart which clearly portrays exactly what part of the JSYU will be involved in timber production.

Commentator: 45

Response: Figure 1-6 has been modified to show both acres and percentage of the JSYU involved in timber production.

16. Comment: How was the 4-year regeneration period used in computing the allowable cut determined?

Commentator: 8,14,37

Response: The regeneration period is one of the inputs used to adjust the allowable cut model to reflect the impact of planned management regimes. Since 90 percent of the JSYU would be managed by the two-stage shelterwood technique, the regeneration period is a function of this practice. The chain of events occurring on any area harvested by the two-stage technique is as follows:

- The initial regeneration cut is completed.

- Site preparation is conducted where required.

- The area is planted with nursery stock during the next planting season.

- Promptly upon successful establishment of the new plantation, the overstory is removed.

- Replanting as necessary to replace reproduction damaged by the overstory removal logging operation is accomplished during the next planting season.

Realizing that the actual timing of these events can vary slightly, the 4-year regeneration period is our best estimate of the average elapsed time between the timber sale and the successful establishement of the new stand. Section 1.5.3 has been changed to incorporate this relationship.

17. Comment: In Section 1.1, reference is made to the use of herbicides at minimum strength. This may be misleading and it should say "recommended strength to get the job done."

Commentator: 28

Response: The text has been changed to indicate that herbicides will be used at manufacturer's recommended strength for the target species involved.

18. Comment: It is recommended that any reduction in the JSYU allowable cut be phased in over a number of years.

Commentator: G-6,G-12,G-26; 3,10,14,28,34,35

Response: Following the issuance of the final environmental statement, consideration will be given as part of the decisionmaking process to phasing in the proposed reduction in the allowable cut. The decision will be based on environmental, social, and economic factors. Any phase-in would require the "over cutting" to be compensated for during the remaining years in the decade by an equal amount of "undercutting," if the current policy of no planned reductions in allowable cut is continued.

9.5.3.2 Comments on Air Quality

1. Comment: The statement contains no calculations of what particulate problems result from burning slash on 50,000 acres.

Commentator: G-20

Response: The proposal calls for slash disposal on 10,000 acres (Table 1-1). Particulate matter resulting from this treatment is discussed in Section 3.1.2.2.

9.5.3.3 Comments on Soils

1. Comment: The ES should establish the relationship of soil classifications enumerated in Appendix D as a determinant of timber production capability.

Commentator: 1, 3, 45

Response: These data have been included in Appendix H which was Appendix D of the draft statement.

9.5.3.4 Comments on Water Resources

1. Comment: The discussion of impacts related to herbicide use as an intensive management practice does not identify specific impacts on fish, wildlife, recreation, and water quality in the JSYU.

Commentator: 26,45

Response: General worst case and most probable case impacts to fish and wildlife have been discussed in Section 3.2.4.4 in accordance with the latest CEQ draft regulations. Impacts to water quality are discussed in a like manner in Sections 3.1.4.2 and 3.1.4.3. An example of an annual herbicide plan has been added as Appendix B.

2. Comment: The discussion of the impacts of road construction on sedimentation in the JSYU streams is both confusing and inadequate. If the extent of sedimentation due to road construction is known, it should be stated. What stabilization techniques will be employed in road construction?

Commentator: 13,28,45

Response: Section 3.1.4.2 (Water Quality-Sediment) and Section 3.2.4.3 have been revised. Estimated amounts and percentages of sediment yield generated by road construction in the proposed action appear in Table 3-10. Stabilization techniques are discussed in Section 1.6.1.2 and in Appendix D as pertains to the protection of watersheds.

3. Comment: What will be the effect of increased peak flows on downstream channel stability resulting from all agencies' land management activities?

Commentator: 8,13

Response: It is not likely that major peak flows will be increased significantly as a result of the proposed action or of all agencies' land management activities. Studies indicate that climate is the major factor influencing major peak flows, and that logging as such does not influence them (Rothacher, 1973). These events normally occur as a result of winter rain-on-snow events when both logged and unlogged soils would be thoroughly wet. Smaller peak flows may occur after early fall storms. However, the decrease in the allowable cut and addition of practices to ameliorate runoff and reduce sediment yield should reduce the impact of the smaller peak flows and allow unstable stream channels to reach equilibrium.

4. Comment: Ten days of water quality monitoring following herbicide spraying should be increased to at least a year.

Commentator: G-16, G-22

Response: Water quality monitoring procedure was not fully discussed in the draft statement. Section 1.6.4.2 has been expanded to provide a more complete explanation of the procedure.

5. Comment: The final statement should include some discussion of the downstream impacts on water and fisheries resources of the proposed plan in combination with land management activities of other agencies in the same watersheds.

Commentator: 13

Response: An analysis of the combined impacts of land management activities of BLM and other agencies on water resources in the Rogue River

Watershed is included in Section 3.1.4.3 and Table 3-15. The fisheries impact has been discussed in Section 3.2.4.5. Chapter 6 also discusses the cumulative impacts attributable to all actions similar to the proposal.

9.5.3.5 Comment on Vegetation

1. Comment: No provision is made for planting species other than Douglas-fir on sites not suited to Douglas-fir. A monoculture is thus established.

Commentator: G-8; 26,31

Response: The proposal recognized that other commercial coniferous species should be planted in certain soils and on certain sites. Section 1.6.5.1 discusses this aspect.

2. Comment: What effect does the application of herbicides have on soil microorganisms, lichens and mosses?

Commentator: 30

Response: Research indicates the soil microorganisms are helpful in breaking down herbicides (Audus 1964) and seem to be unaffected (Bollen 1961; Cullimore 1971). Lichens and mosses are not generally as directly exposed in treatment areas to herbicides and probably receive little herbicide directly. However, removal of target species may change their micro-environment causing a reduction in numbers and size.

Mycorrhizae are important to growth of conifers. Herbicide treatments release more water and nutrients to conifers and enhance conifer-mycorrhizae relationships, resulting in the increased conifer survival and growth associated with herbicide treatments. Adverse impacts on mycorrhizae are not expected.

3. Comment: While the existence of rare and endangered plants in the JSYU is recognized, you have decided to ignore them especially with regard to the use of herbicides.

Commentator: 6,45

Response: Although a full inventory of rare plant locations in the JSYU is not presently complete, protection of these species is implicit in all treatments of the proposed action. Section 1.6 has been modified to make it clear that on-the-ground inventory would precede each specific action. Findings of the inventories are then a consideration in final project design and are addressed in the EAR prepared on each action.

4. Comment: The indirect loss of nitrogen from the soil by the removal of nitrogen producing species such as ceanothus and alder has been completely neglected.

Commentator: 30

Response: Nitrogen losses incurred by the removal of ceanothus and alder are generally temporary because these species regenerate readily in locations where they occur as a climax species. In other areas these species are only transitory in the natural succession of plant species to the climax type (conifers). Removal or treatment of these species is only designed to speed up the successional processes. Indirect losses of nitrogen due to the removal of nitrogen-producing species was not mentioned because it was judged to be insignificant within the context of the total nutrient supply in the ecosystem.

9.5.3.6 Comments on Animals

1. Comments: Wildlife species dependent on old growth are more likely to die than emigrate. Other habitat is nearly always at carrying capacity.

Commentator: 21

Response: Chapter 7 has been changed to reflect this.

2. Comment: Protection measures in the plan for spotted owls are inconsistent with a recent agreement between BLM and the Oregon Endangered Species Task Force. The 440 acres of old growth identified for retention near known spotted owl nests are questionable.

Commentator: S-1,S-2,S-3 2,3,9,21,23,28,37

Response: The proposed action has been modified (see Table 1-10, Issue III), and the interagency task force management guidelines adopted (see the discussion of endangered and threatened species in Section 3.2.4.1). A greater area has been set aside.

3. Comment: The bald eagle is officially listed as threatened in Oregon under the Endangered Species Act of 1973. What efforts will be made to insure protection of habitat for the species?

Commentator: 39

Response: The status of the bald eagle was changed after the DES went to press. The FES has been changed to show the current status. No impacts

to bald eagles are expected from the proposed action. See the discussion of endangered and threatened species in Section 3.2.4.1.

4. Comment: Snag and log retention are inadequate--yarding of all unmerchantable material will remove forage logs needed for cavity birds. Some minimum number should be left.

Commentator: 21

Response: Oregon law requires that all snags over 15 feet high and 12 inches in diameter, within the logging area, be removed. However, habitats for cavity dwellers would be essentially unaltered by the proposal in nearly half of the commercial forest land in the JSYU (see Tables 1-4 and 1-5). Snags will not be removed from riparian areas constituting buffer strips along Class I streams (Section 4.2). Gross yarding which would remove forage logs is not planned for all harvested lands (Table 1-1).

5. Comment: Include impacts of loss of forage logs.

Commentator: 21

Response: A statement has been added to Section 3.2.4.2 indicating that the removal of forage logs and snags will impact those organisms using them.

6. Comment: Riparian zone management is not accomplished by leaving vegetation strips of standard width and intermittent streams receive no protection.

Commentator: 21,39

Response: The proposed buffer strip averages 100 feet depending on terrain and other considerations. Table 1-10 has been modified to clarify this. Intermittent stream protection is also discussed in Table 1-10.

7. Comment: Harvesting dead or dying and cull trees in riparian zones greatly reduces habitat value.

Commentator: 21

Response: A mitigation measure regarding removal of trees from buffer strips has been included in Section 4.2

8. Comment: The specific impacts of road construction projects are not related to the fish, wildlife, recreation and esthetic uses within the JSYU.

Commentator: 45

Response: Fishery and wildlife impacts are discussed in Section 3.2.4.3, visual resources impacts in 3.3.3.3, and recreation impacts in 3.3.1.3.

9. Comment: More discussion of thermal cover requirements is needed.

Commentator: 21, 25

Response: A discussion on thermal cover requirements has been added to the discussion on black tailed deer in Section 2.1.2.2. Table 1-11, Issue II, defines elk cover proposals and Chapter 3 has been modified to reflect impacts on deer.

9.5.3.7 Comments on Recreation

1. Comment: There are many aspects of the proposal which could have adverse effect on the Rogue Wild and Scenic River. They must be further addressed if the statement contending that there are no significant impacts to the river is true.

Commentator: 45

Response: Section 3.4.4 has been rewritten to clarify the impacts of timber management activities upon scenic, recreational, geological, zoological, historical, and cultural values within the Rogue Wild and Scenic River corridor. While noise and the sight of dust may be unpleasant to some recreationists, they would not substantially interfere with public use and enjoyment of values for which the Rogue River was included in the National Wild and Scenic River System.

9.5.3.8 Comments on Visual Resources

1. Comment: Visual management corridors along major highways should be protected from intrusions that might result from two-stage shelterwood harvest.

Commentator: 32,38

Response: VRM Class II lands along major roads will be harvested by a protective shelterwood system (Table 1-10, Issue II). Protective shelterwood provides for multiple entries over an extended period of time. Fewer

trees are removed in each entry thus obscuring harvest operations from notice by the casual observer.

9.5.3.9 Noise

1. Comment: It would seem that timber harvest operations are a more frequent and continuous noise producer than the jet aircraft referred to.

Commentator: 39

Response: The rationale statement in Table 1-11, Issue IV, has been rewritten to remove the comparison to jet aircraft. Timber harvesting was an ongoing activity in proximity to the Rogue River Corridor at the time the area was included in the National Wild and Scenic Rivers System. Section 3.4.4 has been rewritten to further analyze the impacts of noise to recreationists within the Rogue Wild and Scenic River Corridor.

9.5.3.10 Comments on Socioeconomics

1. Comment: Income multipliers were inappropriately treated as job multipliers. Income multipliers are lower than those estimated using an export base approach as in the studies by Beaton and Hibbard (prepared for the Douglas County Board of Commissioners) and by Bell. The BLM should re-examine the derivation and application of its multiplier estimates and correct them.

Commentator G-5,G-12 2,3,18,28

Response: Text and tables were revised in Chapters 2 and 3 based on estimates (updated to 1974) of income and employment multipliers from the Socio-Economic Data system maintained by the BLM. Job multipliers changed very little because original direct and indirect employment effects in the draft statement were based on lower average earnings per year for all workers. The net effect is to reduce estimates of the direct employment while increasing estimates of indirect employment.

The estimates by Beaton and Hibbard and by Bell of income or employment multipliers were derived using a relatively primitive and rough estimating procedure based upon an export or economic base notion of community economic interdependence. In addition, the estimates by Beaton and Hibbard are applicable for Douglas County only. The income multiplier estimates prepared by Youmans for Douglas County are based on a modern estimating procedure. The study indicated that for each dollar of direct personal income resulting from a change in timber harvest or processing, an additional 75 cents results from indirectly dependent employment. The procedure used by BLM indicates indirect

income of 53 cents for Douglas County. The 22 cents disparity in estimates could result from the differences in base year and in estimating procedures. The BLM Socio-Economic Data system estimates indicate an indirect income per dollar direct income of 74 cents in Jackson County and 91 cents in Josephine County.

2. Comment: The discussion of the (employment) impact is substantially different (from part of the BLM defense to the Headwaters suit of 1975). Why the difference?

Commentator: 26

Response: The estimates presented in response to the 1975 suit were for the entire Medford District. Estimates herein apply specifically to timber from the JSYU. The estimates referred to were based upon a less detailed analysis. The estimates presented herein are a more reliable indication of the actual dependence for the JSYU.

3. Comment: Because of reduced timber supply, mills may not continue to automate. Mill modification, utilizing new technology, is aimed at better product recovery. Reduced log size (in second growth management) will require more labor per unit of production.

Commentator: G-7 3,28

Response: The analysis contained in Appendix H of the draft statement (now Appendix K) presumes that, due to competitive forces, the trend toward automation will continue. The estimates of jobs related to logging reflect dampening of the declining labor requirement (after the year 2000) due to reduced timber size. Projections of future labor requirement in logging and processing are retained as in the draft.

4. Comment: There is no discussion of fishery values. Benefit-cost discussion is needed.

Commentator: 21

Response: Table 1-10, Issue I, displays the estimated local personal income dependent upon anadromous fisheries habitat. Estimate of prices applicable for fisheries habitat comparable with timber stumpage prices is not available.

5. Comment: The comparisons in Table 3-19 of the draft mislead the reader to believe that continuation of current management would result in a decline in allowable harvest to 87 MM bd. ft. per year during and following the second decade.

Commentator: 27,28

Response: Changes have been made to clarify that the allowable harvest under the no action alternative (which represents the present situation) is not expected to decline to 87 MM bd. ft. until the ninth decade.

6. Comment: Mills in the Glendale and Riddle area will be adversely affected by the cutback. The final ES should specify these impacts.

Commentator: 2,10

Response: Estimates are provided for the Douglas County area in Section 3.3.5.2. Of the estimated short-term impact in Douglas County, 95 percent would be experienced by workers at mills in the Glendale area.

7. Comment: What of the additional jobs created by the extensive reforestation program proposed?

Commentator: 6,7

Response: As shown in Section 3.3.6.4, an estimated 35 new jobs would accrue due to the proposed forest development program.

8. Comment: The Draft ES on page 8-34 indicates that the community personal income would increase by 5.8 million dollars if herbicides were not used.

Commentator: 29

Response: The text was in error and has been changed to indicate a decrease of 5.8 million dollars in community personal income.

9. Comment: The extreme cyclical shifts in harvest and dependent employment were presented as causing more severe economic and social problems than the proposed permanent shift in timber harvest. This statement indicated that the reader should be most concerned with the cyclical nature of the industry. I must disagree.

Commentator: 3

Response: The comparisons made to recent employment and timber harvest variability are valuable for consideration in relation to the proposed reduction in allowable harvest. Social and economic costs resulting from recent instability far exceed those expected to result from the proposal. Permanent economic and social adjustments can follow the one-time change in harvest level.

10. Comment: Conclusions or a summary of the existing socioeconomic environment should be presented in chapter two.

Commentator: 28

Response: The task of Chapter 2 is to provide a base from which estimates of impacts of the proposed action can be analyzed and presented. Pertinent facts of the existing situation are essential. Conclusions and interpretations regarding the existing socioeconomic environment are not necessary to the environmental assessment process.

11. Comment: The even-flow criterion does not necessarily imply that the well-being of future generations is considered equally as important as that of current generations.

Commentator: 28

Response: Section 3.3.6.3 has been revised to clarify this point.

12. Comment: Changes in timber supply from other sources, and thereby the total community impact, are not adequately presented.

Commentator: 28, 29, 30

Response: Table K-2 of Appendix K includes estimates of timber supply by decade from all sources and for each alternative for the JSYU. These estimates are based on the Beuter report. If all other sources behave as presumed in the Beuter report, there will be (through the year 2025) a stable timber supply at about 560 MM bd. ft. (578 MM bd. ft. during the first decade) for the Medford timbershed, except during the 1995-2005 decade during which timber supply would decline to 460 MM bd. ft. per year. For administrative units related to the Medford Timbershed, the U.S. Forest Service is at various stages in planning that will determine future allowable harvest levels. We do not have information that would allow analysis of changes in timber supply other than that provided by Beuter (1976) and Oregon State Board of Forestry (1977).

It is important to remember, however, that both Beuter and Forestry Program for Oregon are predicated on allowable base acreage remaining constant. See comments on the Alternatives, No. 7.

13. Comment: More explanation is needed regarding the column headings in Table 3-19.

Commentator: 27, 28

Response: Clarification and corrections were made in text introducing the table and in headings and footnotes to the table.

9.5.3.11 Comments on Energy

1. Comment: The ES does not consider and specify energy effects (usage) associated with the proposal and various alternatives.

Commentator: 43

Response: Section 3.3.7 has been added to address energy related issues of the proposal. Energy investment attributable to the proposal would be approximately 1.308 trillion Btu's per year.

Discussion has been added to the analysis of each alternative describing similarities and differences in energy use as compared with the proposal. Estimated energy investment of each alternative is shown in Table 8-4.

2. Comment: The herbicide treatment proposed is another area where energy consumption and conservation could be considered.

Commentator: 43

Response: Energy investment for proposed herbicide useage would be approximately 14.5 billion Btu's as shown in Table 3-24, approximately 1 percent of the total energy consumption. Comparative energy use of the alternatives is as shown in Table 8-4.

3. Comment: It might be possible that some salvage of forest residue and dead material for their fuel value could occur.

Commentator: 28, 43

Response: In Section 3.1.3.4 it is estimated that 80,400,000 cubic feet of cull material, slash and other debris would be stacked and piled within harvest areas during the 10-year proposal period. The Industrial Forestry Association (see letter number 28, page 2) has computed this volume of material to be 94,588 cords of firewood per year if it all were utilized for that purpose.

Recent experience in the JSYU shows a strong demand for wood cutting permits. Most individuals are directed to piled cull material. Preference is toward locations close to the homes of the users. It cannot be predicted how much of the available material would ultimately be utilized for primary or auxiliary home heating when the full potential amounts attributable to the proposal are available.

Should the economics of thermal electricity generation become such that wood fired facilities are practical, it is conceivable that all residual material from timber harvest operations could be marketable. An unknown amount of petroleum derived energy would be required to transport such material from its point of origin in the forest to a point of utilization elsewhere.

4. Comment: Use of energy will represent a resource commitment and should therefore be noted in Chapter 7.

Commentator: 43

Response: While energy was mentioned in the DES as irreversibly committed, quantification of the irretrievable energy investment has been added in Chapter 7.

9.5.3.12 Comments on Land Use

1. Comments: Not enough concern or recognition has been given to the potential for production of livestock forage on these Federal lands.

Commentator: 44

Response: The present utilization of forage by livestock is shown in Table 2-52. Impacts of the timber management program are insignificant on grazing (Section 3.4.1). Since this is an environmental statement on timber management, it does not address the potential for production of livestock forage. A statement on grazing management in the Medford District is scheduled in the future.

2. Comment: It is recognized that the O&C Act prevails over the FLPMA relating to management of timber resources. Do the wilderness review procedures set forth in the DES follow BLM's draft Wilderness Policy and Review Procedures dated February 27, 1978? Do these procedures apply to O&C lands?

Commentator: S-1 25,37

Response: The draft policy and procedure for wilderness review became available after the Josephine DES had gone to press.

It has been concluded that the phrase, "suitable for sustained yield timber management as commercial forest timber land," in the O&C Act applies to high intensity and low intensity timber management lands of the JSYU. These categories of commercial forest land are therefore exempt from the wilderness review mandate of the FLPMA. Other commercial forest lands

(limited management category) as well as non-commercial forest, non-forest lands and intermingled public domain land are to be considered for wilderness review. See Appendix L.

Appropriate changes have been made in Sections 2.1.4.6 and 3.4.3.

3. Comment: A portion of the "Mule Creek potential primitive area" discussed in Chapter 2 has been included in the Wild Rogue Wilderness Area established by Congress. Since Congress has already made its decisions, further study for wilderness should be unnecessary.

Commentator: 28

Response: Section 2.1.4.6 has been changed to reflect that the Mule Creek area was included in the Wild Rogue Wilderness Area component of the Endangered American Wilderness Act of 1978.

9.5.3.13 Comment on the Alternatives

1. Comment: Timber production is assumed as a goal for the JSYU and the alternatives deal only with various methods of achieving timber production.

Commentator: 21, 45

Response: Timber production is a major goal for the management of forest lands in the JSYU as specified by the O&C Act.

The proposed action is a timber management plan, and therefore, the alternatives are limited, with one exception, to those that deal with different intensities or levels of management to meet timber production goals. The exception is the Zane Grey Wilderness Study Area which was added as an alternative because it was not specifically discussed in the Interrelationships with Other Programs section of Chapter I and because of considerable public comments. See also the response to comment number 1 in Section 9.5.3.14.

2. Comment: The procedure of comparing alternatives to the proposed action in Chapter 8 rather than recent past conditions tends to reduce the negative impacts of the proposal.

Commentator: 27

Reponse: Council on Environmental Quality guidelines for preparation of ESs (38 FR 147: 20553, August 1, 1973) and applicable Department of the Interior and BLM manuals state that the alternatives are to be compared with the proposed action for evaluation purposes. In Chapter 3, impacts of the proposed action are assessed using the existing environment as baseline.

3. Comment: In the discussion of alternatives in Chapter 8, no mention is made of mitigating measures for impacts on air, water, or soil resources.

Commentator: 13

Response: The alternatives in Chapter 8 all relate to various levels of timber harvest. Mitigation measures included in the proposal as project design features (Section 1.6) and those of Chapter 4 apply to the alternatives as well.

4. Comment: Alternatives 1, 6, and 7 are unrealistic management options. Inclusion of wilderness considerations as an aspect of no timber management does not adequately deal with wilderness issues in the JSYU.

Commentator: S-1, S-2, 7, G-9; 30, 37, 45

Response: Alternatives 1, 6, and 7 of the draft ES have been removed from the final ES. A specific wilderness study area alternative, based on an area suggested in response to the draft statement, has been included in the final statement.

5. Comment: The no action alternative is not a viable alternative since it would perpetuate the present situation.

Commentator: 27, 30

Response: Inclusion of a no action alternative provides a benchmark for comparison of the present level of harvest with the proposal and other alternatives. In addition, it gives an indication of the future environment should the proposal not be adopted, a discussion which is normally included in Chapter 2.

6. Comment: Alternatives 4 and 5 are unrealistic since both discuss increased removal of old growth timber thereby violating sustained yield and even flow policies.

Commentator: S-2; 30, 45

Response: Utilization of surplus inventory identifies a level of increased initial harvest which can be attained in the proposal period without affecting long term sustained yield at the proposal level. It is therefore considered viable.

Forestry Program for Oregon is a major proposal of the State of Oregon. It is useful to assess the capability of the JSYU to provide a share of the projected statewide timber shortfall.

Under Department of the Interior and BLM guidelines, an alternative in an ES need not be constrained by present policy, law, or regulations. Thus a new wilderness study area alternative has been added despite the inclusion of sustained yield production areas within its boundary.

7. Comment: The Forestry Program for Oregon alternative should be amended to reflect its actual assumptions, harvest levels, and environmental, social and economic effects rather than those your planners incorrectly attributed to it.

Commentator: S-2; 27, 37

Response: Alternative 5 has been revised to incorporate information furnished by OSDF.

It is recognized that there is a basic difference in the assumptions underlying the Forestry Program for Oregon analysis and the BLM analysis portrayed as Alternative 5. The OSDF projection is based on the assumption of a stable timber production land base roughly equivalent to that used in the 1970 allowable cut computations. Since 1970, however, BLM has adopted a number of new policies relating to the definition of the allowable cut land base and has implemented these policies through the Timber Production Capability Classification (TPCC) and the Bureau Planning System. This has resulted in the 1977 allowable cut base being roughly 33 percent smaller than that used in the 1970 allowable cut computations and in the OSDF study.

Alternative 5 is designed to try to meet the harvest levels requested by the OSDF Forestry Program for Oregon, utilizing the newly defined, reduced land base. This approach is not intended to cast aspersions upon the OSDF study. Alternative 5 has been structured in this manner because it is more useful to BLM decisionmakers in this form.

9.5.3.14 General Comments

1. Comment: The draft ES is inadequate because it focuses its analysis exclusively on timber harvesting practices without consideration of other land use alternatives and inappropriately relegates more comprehensive analysis of land uses for the JSYU to the province of the Management Framework Plan (MFP).

Commentator: 9, 45

Response: The MFP sets forth recommendations for land use allocations and resource management for the total 425,720 acres of public land in the Josephine SYU. These recommendations were made following a comprehensive analysis of land use and resource management alternatives and were selected

on the basis of best meeting the objectives established for the unit. The objectives, alternatives, analyses and rationale for the recommendations are all documented in MFP narratives, maps, and overlays which are available at the Medford District Office. The process followed in developing the MFP recommendations involved continuous public input, review, and comment.

A timber management plan was developed and presented to the public that is consistent with the MFP recommendations. This timber management plan constitutes the proposed action in the DES. To permit the reader to fully evaluate the timber management plan, that part of the MFP analysis which dealt with the inclusion or exclusion of high intensity land in the proposed action has been abstracted from the MFP and inserted in Section 1.8.1. The public thus is provided a further opportunity to comment on the recommended land use allocations set forth in the MFP before a decision is made.

Since the proposed action is a timber management plan and not a MFP or land use plan, the MFP recommendations described are limited to those that relate to the proposed timber management plan. Not only are these recommendations described, but the analyses and rationale to support the recommendations are also summarized, and alternative recommendations are identified.

As far as adequacy is concerned, the MFP was developed in accordance with Bureau Planning System procedures and standards. The utility of the MFP is evidenced by the fact that it was used in developing the proposed timber management plan. Furthermore, it will be used in developing activity plans for other resources following the MFP decision.

Based on the public comments received on the DES, along with Bureau analyses, a decision on the MFP recommendations and proposed timber management plan will be made no sooner than 30-days after the filing of the FES with EPA. The decision can result in a change in the MFP recommendations and/or proposed action.

2. Comment: The adequacy and accuracy of TPCC is questionable. Intensive inventory is required to identify land dedicated to sustained yield timber production and, conversely, to remove land from the timber production base.

Commentator: S-2, G-5, G-6, G-12; 2, 3, 11, 12, 14, 15, 16, 27, 45

Response: Section 1.8.1 has been revised to explain the relationship of inventories, including TPCC, to the development of the proposal through the Bureau Planning System.

The Association of O&C Counties funded an evaluation of the TPCC by the firm of Mason, Bruce and Girard (MBG). MBG was asked by the Association to "examine the TPCC criteria and the application of the criteria to the Josephine Master Unit." To accomplish this end, MBG field sampled 23 areas designated by the TPCC as withdrawn.

MBG chose to sample only the withdrawn areas. The implications of this decision were recognized in the initial draft MBG report, dated Nov. 10, 1976, thusly:

> "Errors ... may have been made (by the BLM) on commercial forest TPCC classifications. Thus it is reasonable to assume that intensive re-evaluation of all units will result in the removal of some areas from the withdrawn category and the placing of others in it. Therefore, the net result may not appreciably change the land base for the allowable cut determinations." (Paragraph 4, page 27).

The MBG report contains four suggestions which, if adopted, would allow for the reinclusion of 30-50 percent of the currently withdrawn lands into the allowable cut base. However, one of these suggestions calls for lengthening the time standard for obtaining regeneration. This is contrary to policy as the BLM has formally adopted the Church Subcommittee guidelines (see Section 1.1) and our TPCC criteria are based on these standards. Thus, the MBG figures are an approximation of what might result from a different policy, but they are not germane to a discussion of the adequacy of our present classifications.

This fact is recognized on page 4 of the MBG report where it is stated: "This report should not be construed as saying the BLM classification work is wrong 35% of the time nor that fully 50% of the withdrawn areas would be returned to the (allowable cut base), as seems to be indicated ...." With this admission, the summary finding of the MBG report seems to be that "it is our opinion from the analysis of the data collected in the regeneration survey that serious re-evaluation efforts should be made of areas classified as withdrawn ...." (Page 4).

We certainly agree with this premise. Our procedures recognize that the original TPCC classifications need refinement, and we incorporated a procedure whereby the on-the-ground detailed information from our field inventory plots was used to verify and/or modify the original TPCC classifications. As a result of incorporating ground truth as found on our inventory plots, some areas moved back into the allowable cut base while other areas left the allowable cut base. As the MBG report anticipated, the moves were largely offsetting and the allowable cut base remained constant.

A secondary recommendation contained in the MBG report is that a category of the withdrawn lands with potential for sustained timber harvest under some degree of management should be formed. This has been done. The districts were instructed to review their withdrawn categories and to identify those lands which, although not suitable for inclusion in the allowable cut base under current policy, were expected to be manageable under specific regimes for a planned level of output.

The Medford District identified this category on the JSYU and termed it Low Intensity Lands. The original TPCC listed this category as containing

approximately 26,000 acres. As a result of their final plot reclassifications, this figure was increased to over 55,000 acres primarily by reevaluation of acres in the limited management category. However, under the proposed plan management, activities for the upcoming decade would take place only on the 26,000 acres presently identified on the TPCC maps.

Basically, the major recommendations contained in the MBG report have been incorporated into our system. The report also contains numerous other suggestions which have merit and which will prove valuable as we refine our procedures over the next 4 years.

3. Comment: The goals of the Oregon Land Conservation and Development Commission (LCDC) should be integrated into the final ES.

Commentator: S-2; 37, 38

Response: Table 1-13 has been prepared and included in Section 1.8 relating the proposal to applicable LCDC goals. A similar table in Chapter 8 relates the alternatives to LCDC goals.

4. Comment: Substantiation of the 80-year optimal rotation should be discussed, with alternatives, based on local yield tables. The rate of growth may indeed climax at 100 or 120 years.

Commentator: 30

Response: The allowable cut computation program employed does not utilize a specific rotation age as an input. The effective rotation age is an output of the allowable cut computer model. During the course of the 400-year projection period, rotation age may vary for each decade based on the model's projection of the timber stands in that decade. All volume computations were based on local yield tables derived from tree form data gathered in the JSYU.

5. Comment: We note that in all those acres over 250 years of age (84,243 acres, over one-third of the area) the annual volume losses are substantial. While this is somewhat to be expected in these old stands, our concern arises over the fact that most of these same stands were showing positive net growth at the beginning of the 1971 plan period. This means that the rate of mortality is increasing. Your own data indicate that the net losses on this one-third of the area are 35 times greater than in 1970--about 0.2 cubic feet per acre per year in 1970 versus 7.65 cubic feet per acre per year in 1976.

Commentator: 27

Response: The growth and mortality figures quoted are derived as a function of the empiric yield curves computed for both the 1970 and the 1976 inventories. These curves are portrayed graphically in Figure 1-7.

The 1970 inventory was based on field plots installed systematically on a 1.7 mile grid. While an inventory design such as this gives statistically reliable data for the unit as a whole, it is considerably less reliable when used to extrapolate values for portions or subdivisions of the whole.

By contrast, the 1976 inventory is based on a stratified sampling design. It provides statistically sound data on the whole as well as for each strata such as old growth stands, second growth, various age class groupings, etc.

As a result of the improved sampling design, the empiric yield curve derived from the 1976 inventory is much more representative of on-the-ground conditions. The apparent discrepancies between the growth and mortality figures derived from the two curves are not a function of actual trends. Rather, they represent better data gathered as a result of an improved sampling design.

6. Comment: Why is only 2 percent figured for breakage in the proposal when the allowable cut plan presently in effect allowed 13 percent?

Commentator: 9, 25, 30

Response: The breakage factor is intended to make allowances for a loss of merchantable volume caused by damage during falling of the tree over and above the defect which is accounted for by the cruiser in his original volume estimation.

The difference in the 13 percent figure used in 1970 and the 2 percent figure used currently is accounted for by two factors.

a. Change in technology. Tree pulling equipment and the use of hydraulic jacks are two types of newly developed equipment to aid in directional falling of trees so as to minimize breakage.

b. The 13 percent figure related the board foot standard used in 1970. The 2 percent figure relates to the cubic volume standard currently used. Much of the material culled by a board foot log rule is usable under a cubic foot rule, hence, the effect of breakage on total merchantable volume is somewhat diminished.

The Medford District's Young Growth Management Committee studied hidden defect and actual breakage on commercial thinning sales in the district. Comparison of gross volume to net volume disclosed the 2 percent factor to be applicable to young growth forests as well.

7. Comment: Is the stocking density accurate? Can the BLM justify a 20 percent discount factor for "holes" in 1970 and a zero percent discount

factor now? In other words have all streams and outcroppings and other holes been identified in some other part of the planning process?

Commentator: 9, 25

Response: Incomplete stocking has been recognized in several parts of the planning process.

1. The TPCC system has classified some poorly stocked lands formerly in the base acreage for withdrawal from timber production.

2. A Stand Density Index method developed by the U.S. Forest Service, Pacific Northwest Experiment Station, was used to adjust productivity estimates more than 20 percent downward from normal yield table levels on lands classified for timber production.

3. Acreage in future roads is subtracted from the allowable cut base acreage using the computerized projection model and estimates of future road requirements.

4. Areas occupied by roads are determined by current inventory methods and that acreage is not included in the allowable cut base.

8. Comment: How will logging and yarding methods be specifically related to site conditions? The environmental statement should indicate what special provisions will be included in timber sale contracts to minimize sedimentation impacts.

Commentator: 13

Response: During the planning of individual timber sales soil scientists, wildlife and fisheries biologists, and other specialists visit proposed sale areas to consult with the foresters. Data gathered on the ground are used in preparation of the EAR (see Section 1.8.4) in which each resource specialist analyzes potential impacts of proposed and alternative methods. Based on the findings in the EAR, specific project design features for the sale are prepared.

9. Comment: What are the protection measures to be used when yarding through streams as discussed in Section 1.6.1.1?

Commentator: 21

Response: The referenced section deals with installation of stream crossing structures during road construction or reconstruction. Protective measures are determined by the size of the structure and stream values

at risk. Measures can include specified season for installation, limitations on equipment to be employed, etc.

In a broader sense the question can be related to logging and the yarding of timber through streams. Yarding through streams is normally prohibited. Buffer strips along streams are an integral part of the proposal. Should it be absolutely necessary to yard logs across a stream, full suspension cable systems would be employed or tractor crossing points limited in number and location specified.

10. Comment: How are environmental protective measures contained in timber sale contracts financed; by BLM or by the purchaser?

Commentator: 13

Response: Project design features discussed in Section 1.6 become special provisions in timber sale contracts. Special provisions are carefully tailored to the circumstances of the situation as it is identified on the ground. The appraised cost of each operation required in a contract is deducted from the estimated value of the timber being sold. In this manner the purchaser is paid to undertake the required environmental protection practices.

11. Comment: Research seems to be one item of low priority throughout the planning process.

Commentator: G-13 25,32

Response: We cannot agree that forestry research is a low priority item. In addition to the ongoing research projects listed in Section 1.7, BLM is a cooperator in the new Forestry Intensified Research program (FIR) also discussed in that section. Data resultant from past and presently ongoing research were utilized in the development of the proposal throughout the Bureau planning process.

12. Comment: An issue not addressed in the DES which deserves attention is the possibility of utilization and marketing of non-commercial species including hardwoods.

Commentator G-10 26,30

Response: Section 1.8.1 discussed MFP proposed decisions with regard to minor forest products. Emphasis is on firewood as that is the dominant demand. Non-commercial species including hardwoods may be sold for other uses than firewood if the sale is not in conflict with other resource considerations of the MFP.

13. Comment: Chapter 4 provides no discussion of mitigation measures considered to overcome adverse impacts identified in Chapter 3. Project design features contained in Section 1.6 are relied on to accomplish all mitigation although how this is to occur is not indicated.

Commentator: 45

Response: Section 1.6 has been rewritten to provide examples of standard procedures which constitute mitigation measures. It is not possible to list all such measures which have been developed through decades of timber management. Standard procedures employed in all applications of a treatment and specific procedures which may be employed depending on the circumstances of the treatment are contained in Bureau directives which are available for review.

Mitigation measures set forth in Chapter 4 must be real (workable) and are a commitment on the part of BLM officials. Mitigation measures considered during DES preparation but not approved by BLM management were not included in the draft statement.

Based on public comment to the DES, however, four mitigation measures have been approved and are now included in Chapter 4.

14. Comment: Cumulative impacts should be assessed from two perspectives. The same or similiar treatments on all lands within the JSYU should be assessed rather than just those impacts attributable to BLM action. Secondly, the cumulative impacts of all BLM treatments contained in the proposal should be assessed.

Commentator: 13,45

Response: Additional discussion of cumulative impacts has been incorporated into Chapter 6. Table 1-1 shows the combinations of all treatments included in the proposed action. The narrative in Chapter 6 attempts to reach conclusions identifying the effects which will result and trade-offs to be made if the proposed action is implemented, rather than simply summarizing the impacts. The specific quantification of impacts from the proposed action can be found in Chapters 3 and 5.

Appendix A

Annual Timber Sale Plan

This appendix is illustrative of the timber sale plan which would be implemented under the proposed action. As shown in Table A-1, it includes 103 million board feet (Scribner equivalent), of which 9 million board feet are trial harvest from low intensity lands.

Maps for each tract in the proposed sale plan complete the appendix.

Table A-1

Proposed Timber Sale Plan, JSYU - Fiscal Year 1979

Sale Name	Tract Number	Location: Township	Location: Range	Location: Section(s)	Road Construction: New (miles)	Road Construction: Reconstruction (miles)	Road Construction: Right-of-Way (acres)	Volume MM bd. ft.	Harvest Method (acres): Shelterwood Cable	Harvest Method (acres): Shelterwood Tractor	Harvest Method (acres): Clearcut Cable	Harvest Method (acres): Clearcut Tractor
Crooks Clean-up	79-23	37S	7W	34,35	5.5	-	26	6.7[1/]	710	78	35	-
		38S	6W	1								
		38S	7W	2,3								
Low East	79-24	39S	6W	23	-	2.5	-	4.0	365	-	63	-
Little Lo-Cal	79-25	40S	8W	23,24	-	3.5	-	2.0	160	241	-	-
7 Come 11	79-26	34S	4W	7	0.7	7.0	-	6.8	290	16	57	-
		34S	5W	11								
Logan Cut	79-27	40S	8W	3,9	2.7	1.3	22	7.0	-	459	-	-
Swamp Flat	79-28	39S	6W	1	-	4.5	-	2.0	143	-	38	-
Six Mile Residual	79-29	31S	9W	11,15	-	-	-	3.5	-	-	77	45
White Horse	79-30	31S	4W	27,28,33,34	0.7	-	5	4.5	-	33	100	10
		32S	4W	1,3,11								
Panther Resalvage	79-31	31S	9W	23,25	-	-	-	3.5	-	-	128	26
Ump Cow	79-32	31S	4W	21,22	-	-	-	6.0	-	-	154	-
Angel Camp	79-33	33S	3W	1	-	-	-	4.5	-	-	140	20
Dad's Creek	79-34	32S	7W	15,21	6.7	-	22	5.5	200	-	50	-
Cold Springs	79-35	32S	9W	15,16,21,22	0.8	-	-	8.5	-	-	130	-
Skull Creek[2/]	79-36	32S	7W	31	1.9	3.7	10	3.4	142	-	-	-
Julie Creek	79-37	34S	9W	25,35,36	0.5	-	4	6.0	95	75	110	41
Coyote Creek	79-38	33S	5W	21,22,23	0.1	-	1	4.0	300	329	15	-
				24,26,27,28								
Wildcat	79-39	32S	5W	13,23	0.5	-	4	3.0	430	20	15	15
Archer-McKnabe	79-40	33S	7W	33,34	0.5	-	4	5.0	333	222	-	-
		34S	7W	3,4,9								
Eastman Gulch	79-41	33S	5W	33,34	0.5	-	4	7.0	166	553	10	-
		34S	5W	3,4								
Starveout[2/]	79-42	32S	4W	32,33	4.0	0.5	25	3.0	100	50	-	-
		33S	4W	5								
Miscellaneous Sales	None	Unknown			None	None	None	7.1[3/]	Unk.	Unk.	Unk.	Unk.
TOTALS					25.1	23.0	127	103.0	3,434	2,076	1,122	157

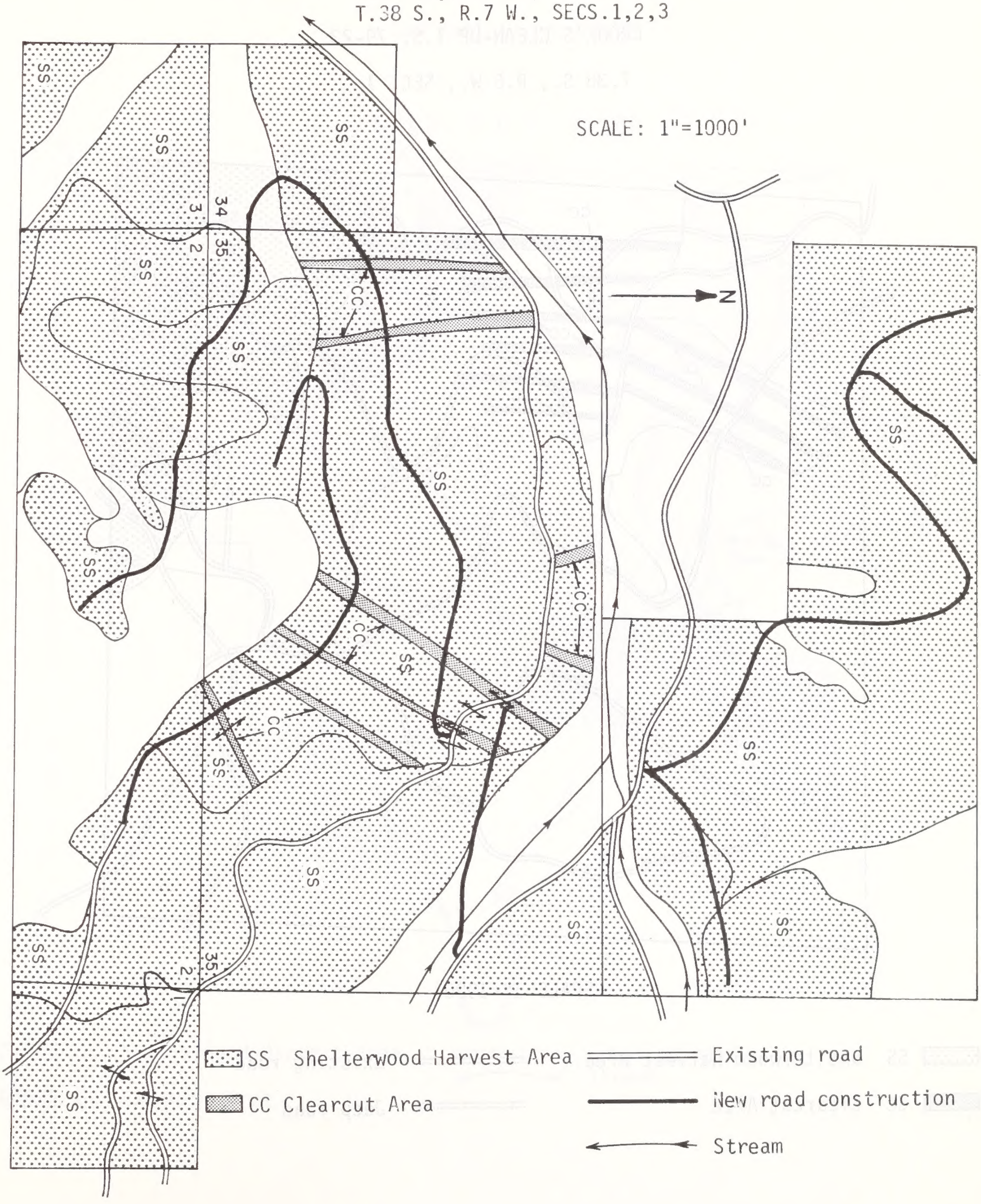
1/ Includes 2.0 MM bd. ft. from trial harvest on 199 acres of low intensity lands.
2/ Entire sale is trial harvest on low intensity lands.
3/ Includes 0.6 MM bd. ft. from low intensity lands.

TS 79-23
Sheet 1 of 2

Josephine Proposed Timber Sale Plan
For FY 79

CROOK'S CLEAN-UP T.S. 79-23
T.37 S., R.7 W., SECS.34,35
T.38 S., R.7 W., SECS.1,2,3

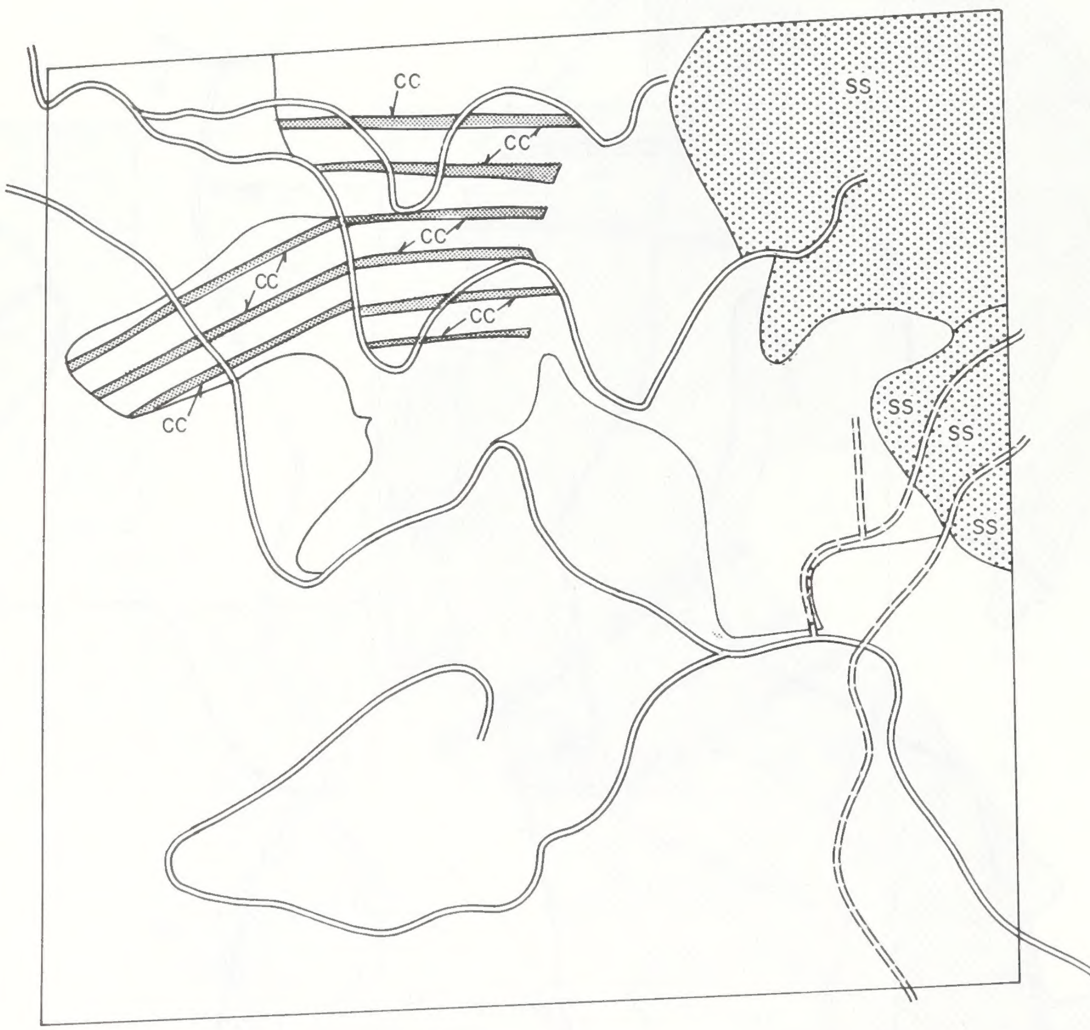
SCALE: 1"=1000'



Josephine Proposed Timber Sale Plan
For FY 79

CROOK'S CLEAN-UP T.S. 79-23

T.38 S., R.6 W., SEC. 1

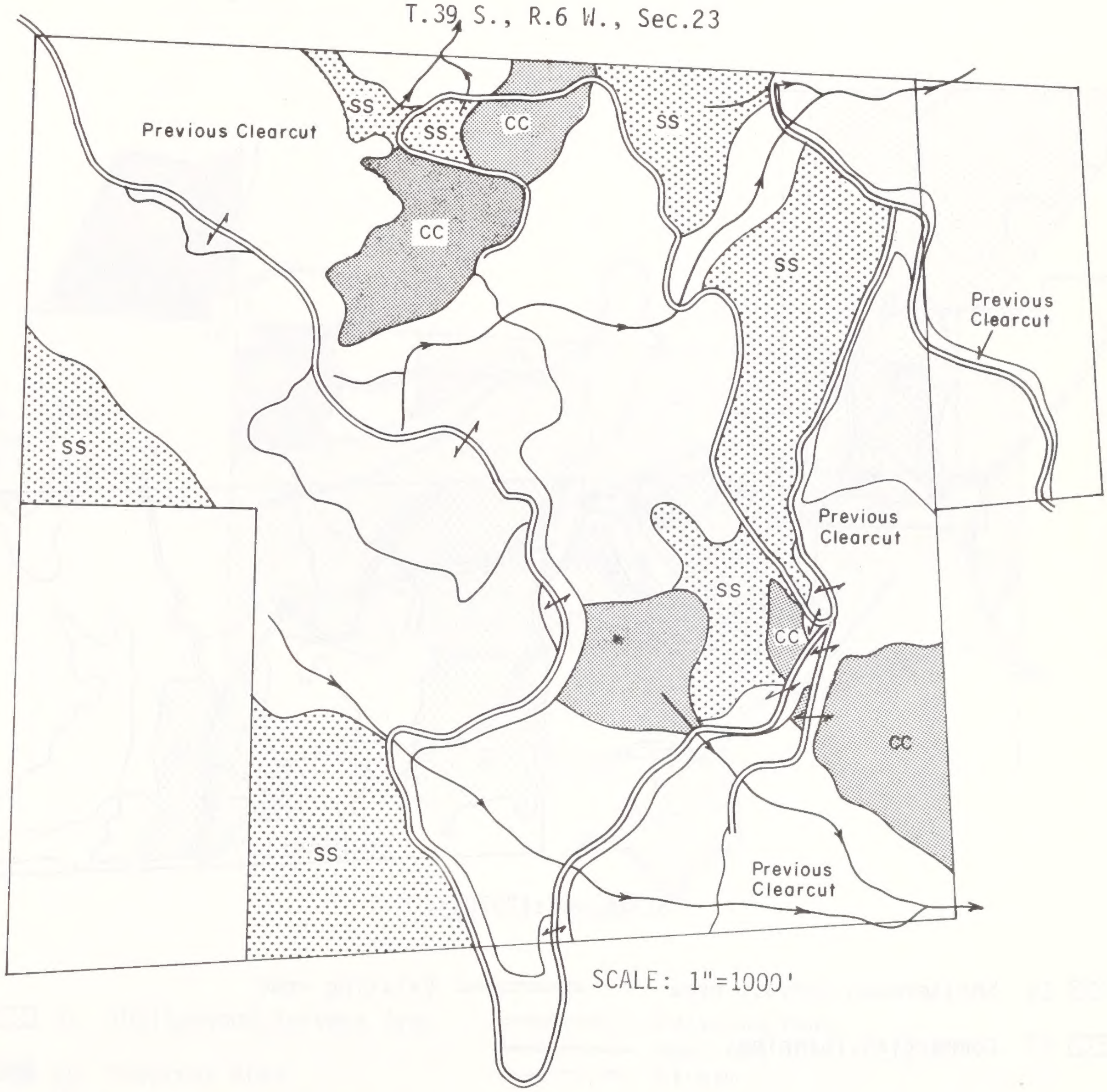


SCALE 1"=1000'

SS	Shelterwood Harvest Area		Existing road
CC	Clearcut Area		Jeep road

Josephine Proposed Timber Sale Plan
For FY 79

Low East TS No. 79-24



SS Shelterwood Harvest Area

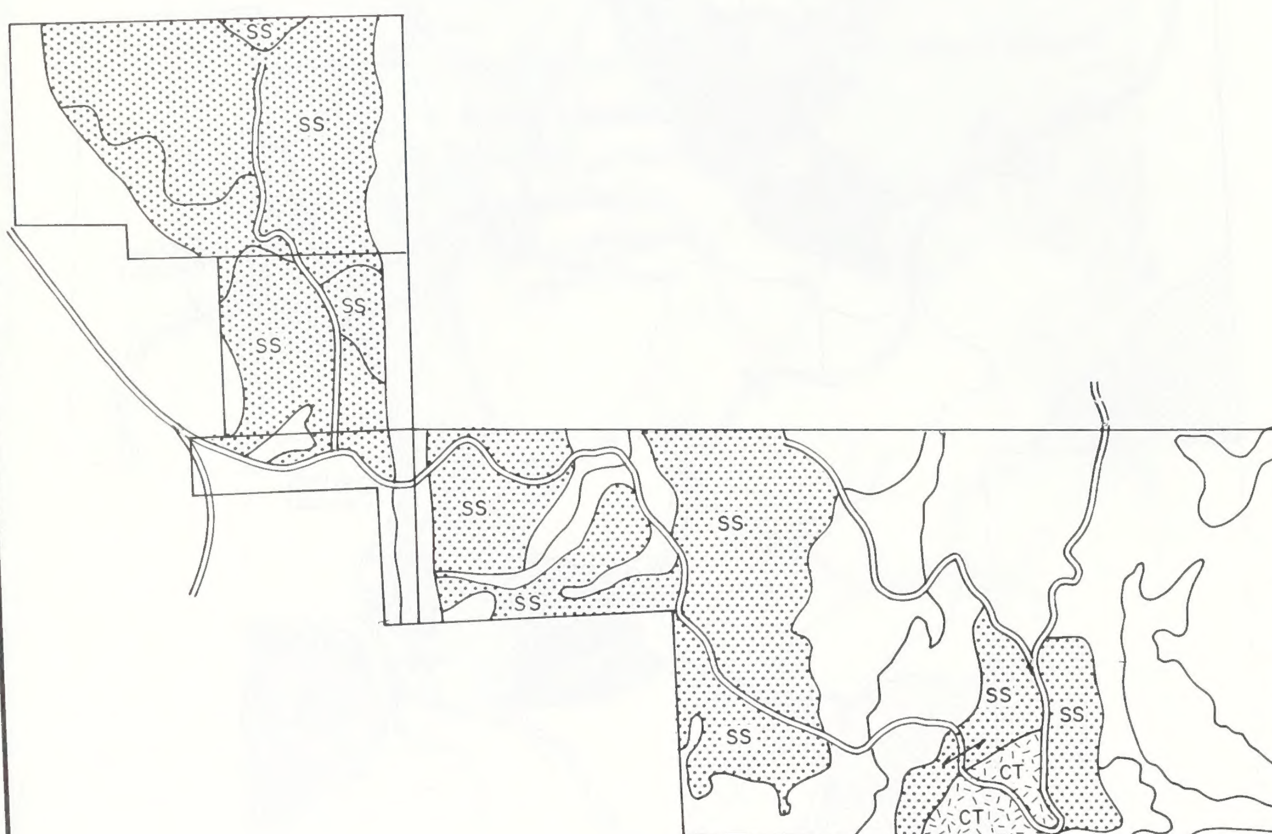
CC Clearcut Area

Existing road

Stream

Josephine Proposed Timber Sale Plan
For FY 79

LITTLE LO-CAL T.S. 79-25
T.40 S., R.8 W., Secs. 23,24



SCALE = 1:12500

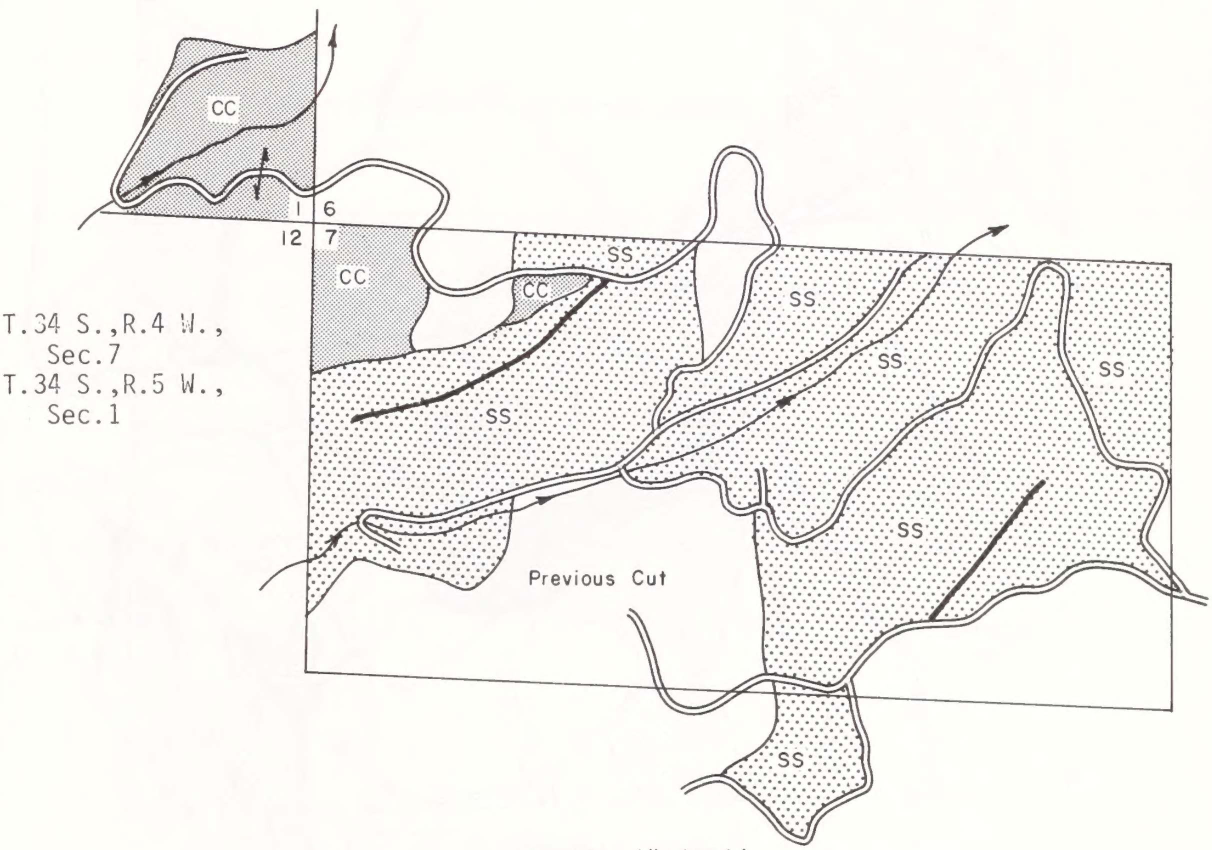
SS Shelterwood Harvest Area

CT Commercial Thinning

Existing road

Josephine Proposed Timber Sale Plan
For FY 79

TIMBER SALE 79-26



SCALE: 1"=1000'

SS Shelterwood Harvest Area

CC Clearcut Area

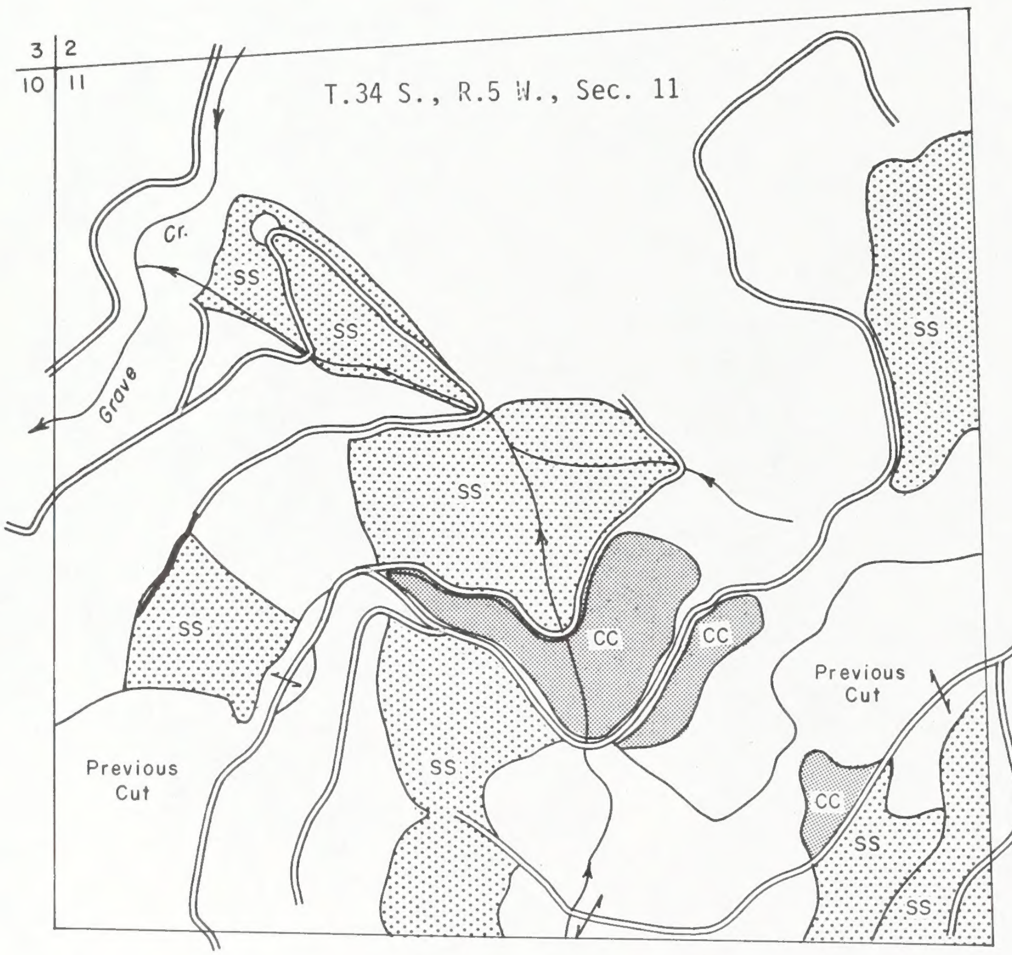
Existing road

New road construction

Stream

Josephine Proposed Timber Sale Plan
For FY 79

TIMBER SALE 79-26



SCALE 1"=1000'

SS Shelterwood Harvest Area

CC Clearcut Area

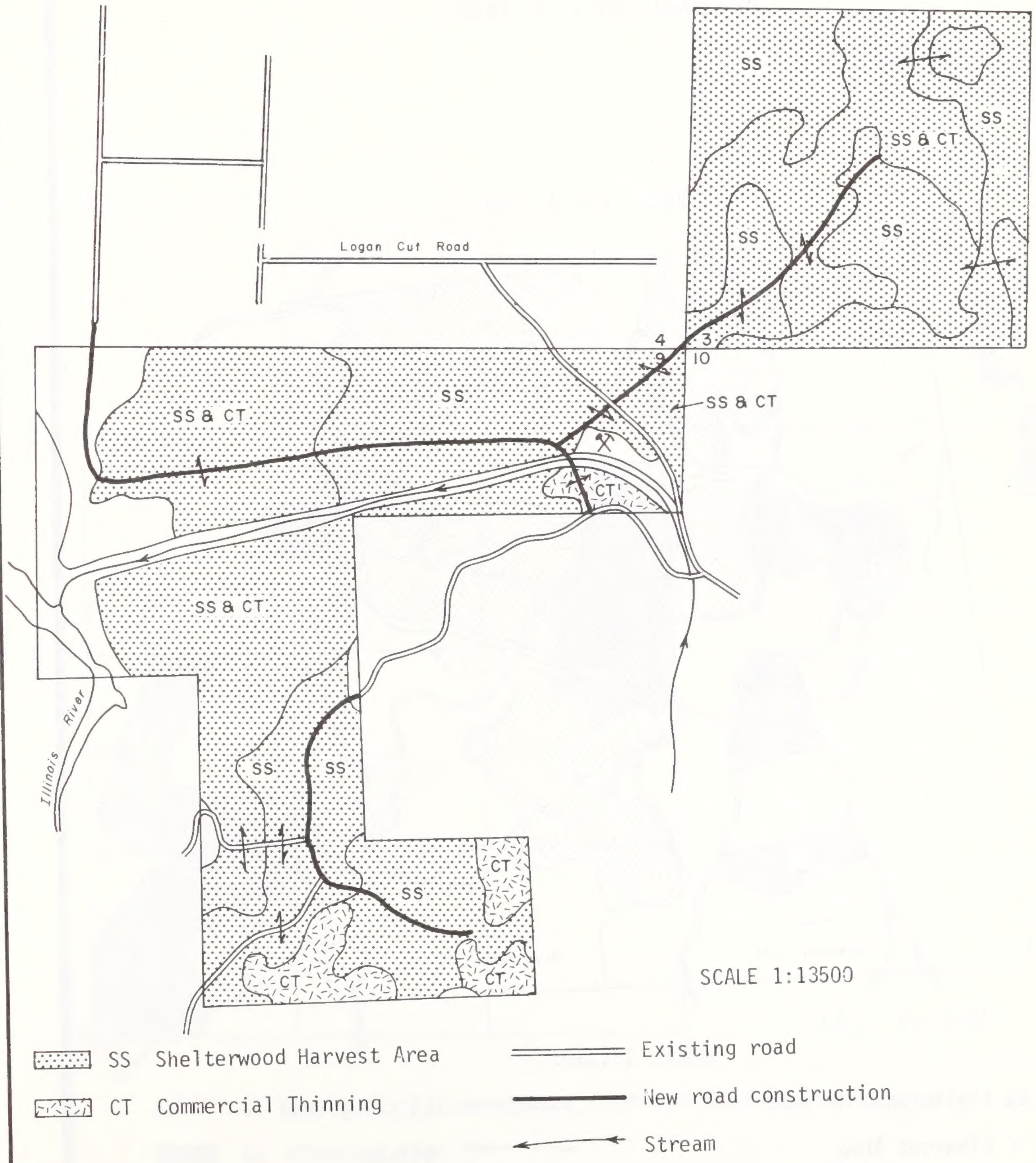
Existing road

New road construction

Stream

Josephine Proposed Timber Sale Plan
For FY 79

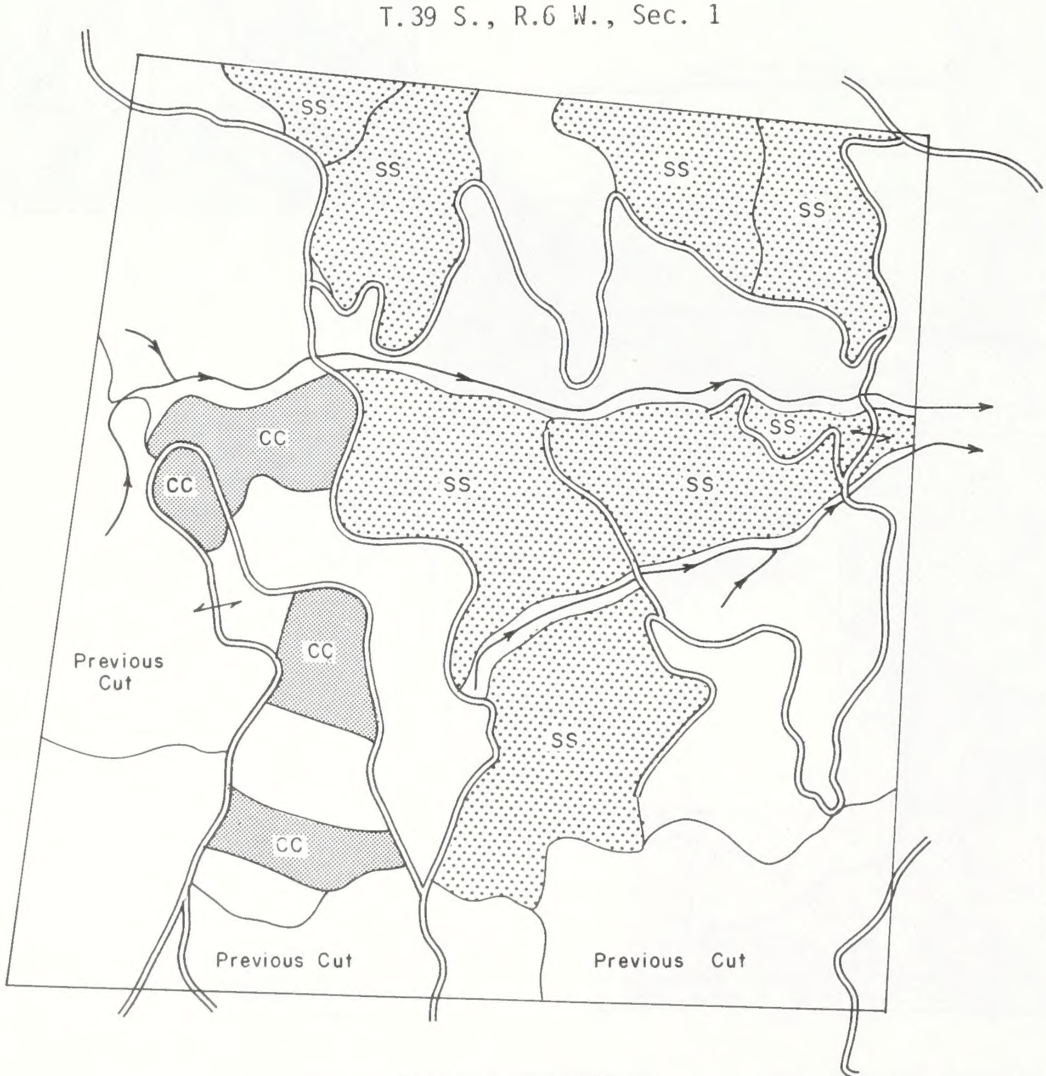
LOGAN CUT T.S. 79-27
T.40 S.,R.8 W., Secs. 3,9



Josephine Proposed Timber Sale Plan
For FY 79

SWAMP FLAT T. S. 79-28

T.39 S., R.6 W., Sec. 1



SCALE: 1:13500

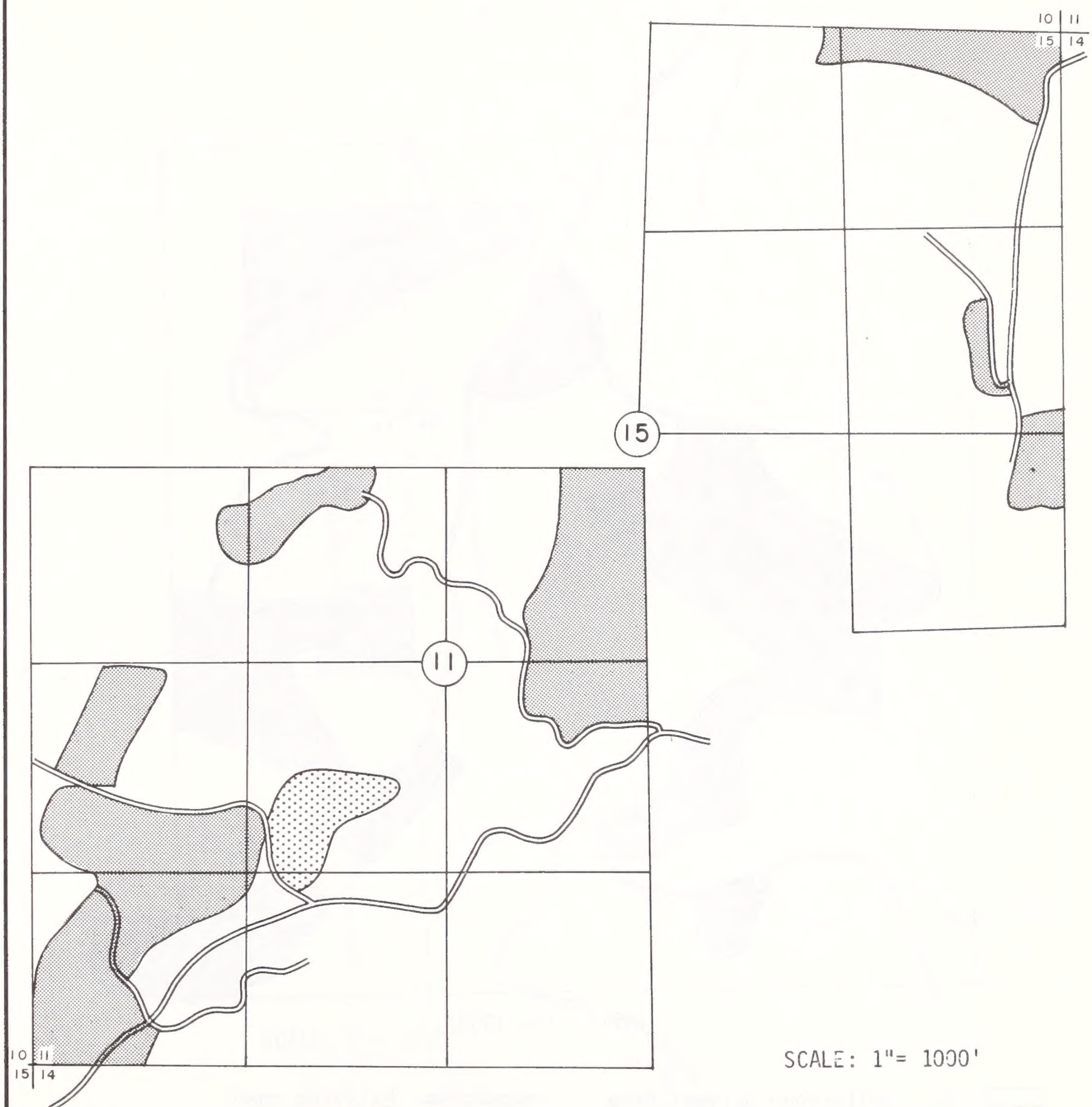
SS Shelterwood Harvest Area — Existing road

CC Clearcut Area — Stream

Josephine Proposed Timber Sale Plan
FOR FY 79

6 MILE 79-29

T.31 S., R.9 W., SECS. 11,15



SS Shelterwood Harvesr Area — Existing road

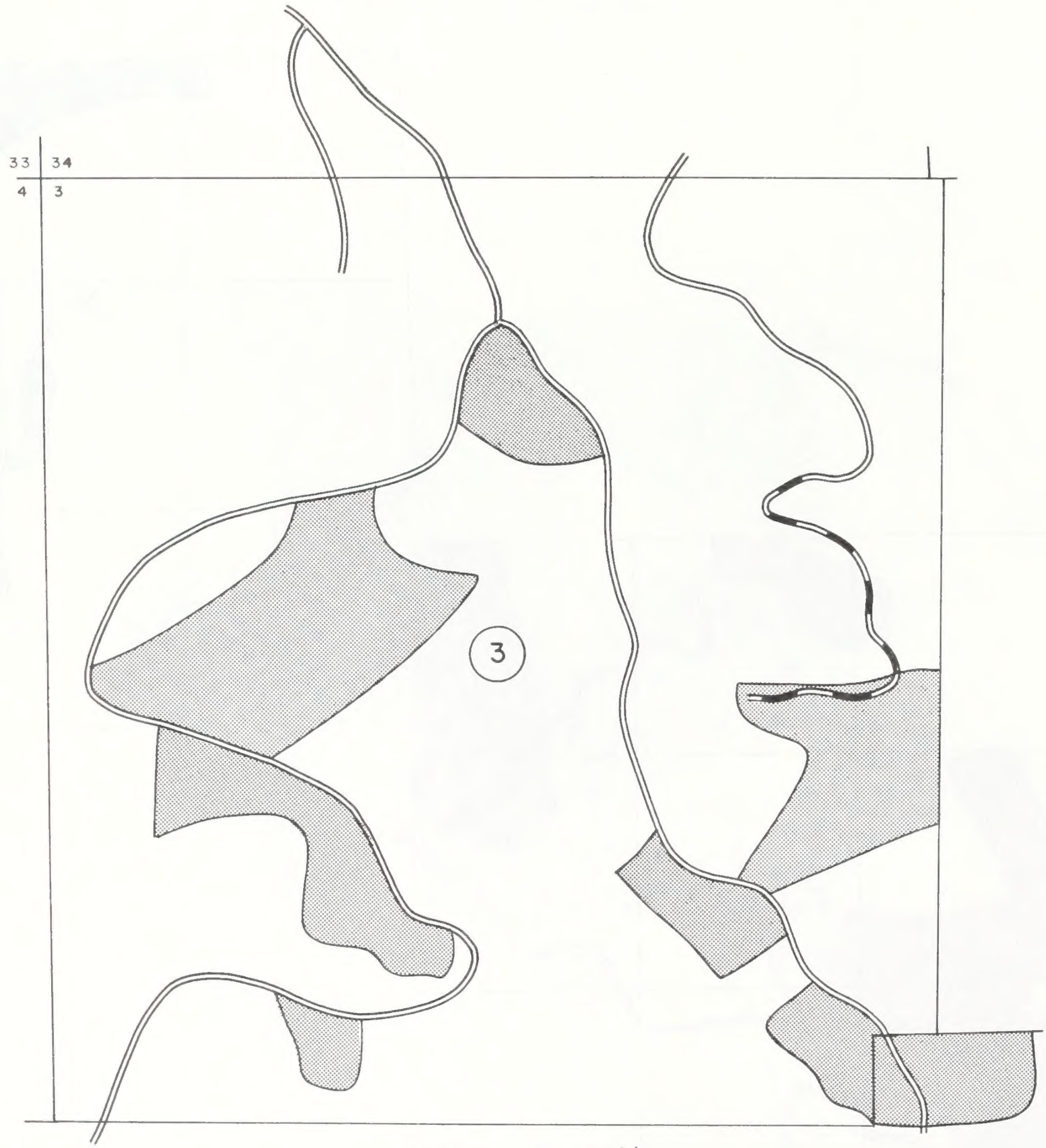
CC Clearcut Area

Josephine Proposed Timber Sale Plan
For FY 79

TS 79-30
Sheet 1 of 2

SALE NO. 79-30

T.32 S., R.4 W., SEC. 3



SCALE: 1"= 1000'

SS Shelterwood Harvest Area

CC Clearcut Area

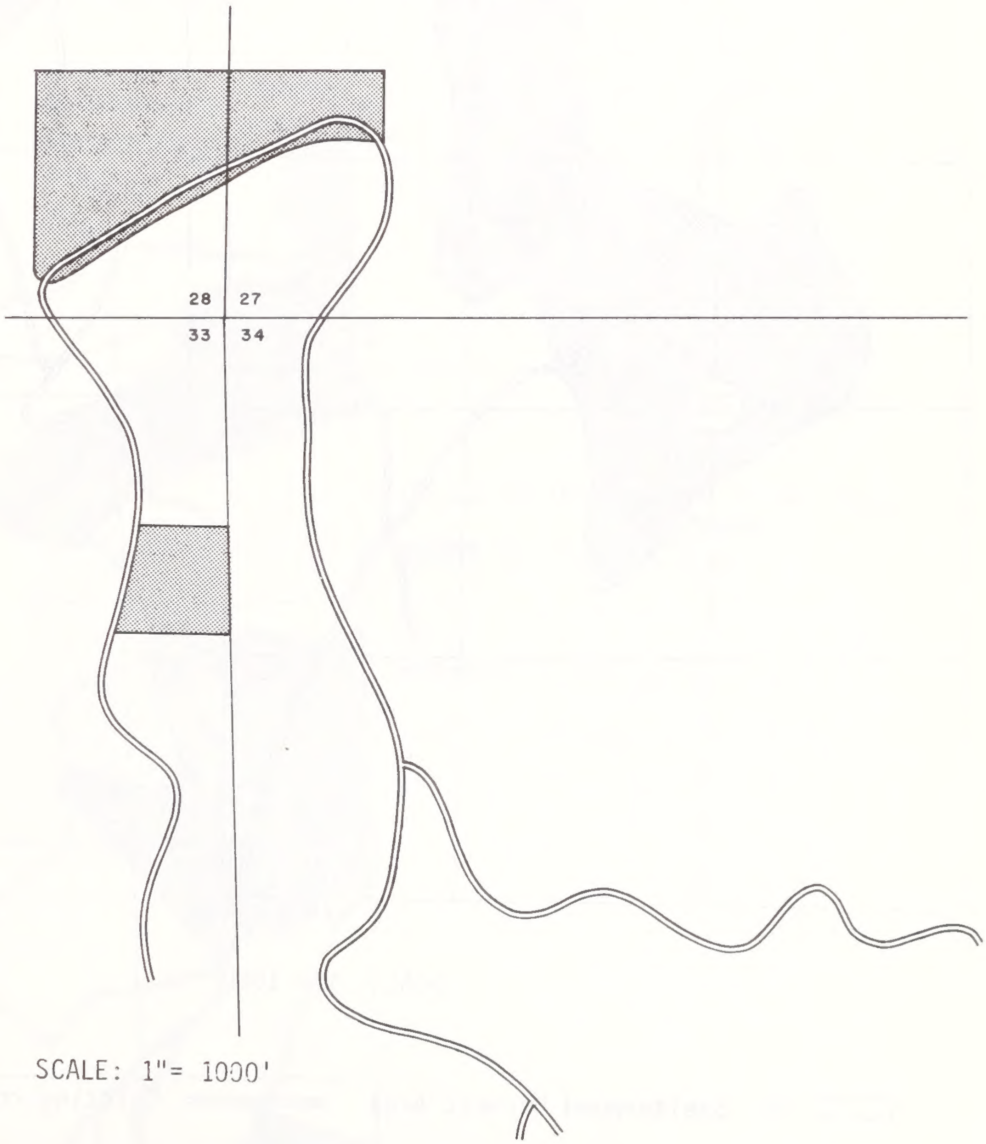
Existing road

Proposed road

Josephine Proposed Timber Sale Plan
For FY 79

SALE NO. 79-30

T.31 S., R.4 W., SECS. 2,3
T.32 S., R.4 W., SEC. 3



SCALE: 1"= 1000'

SS Shelterwood Harvest Area

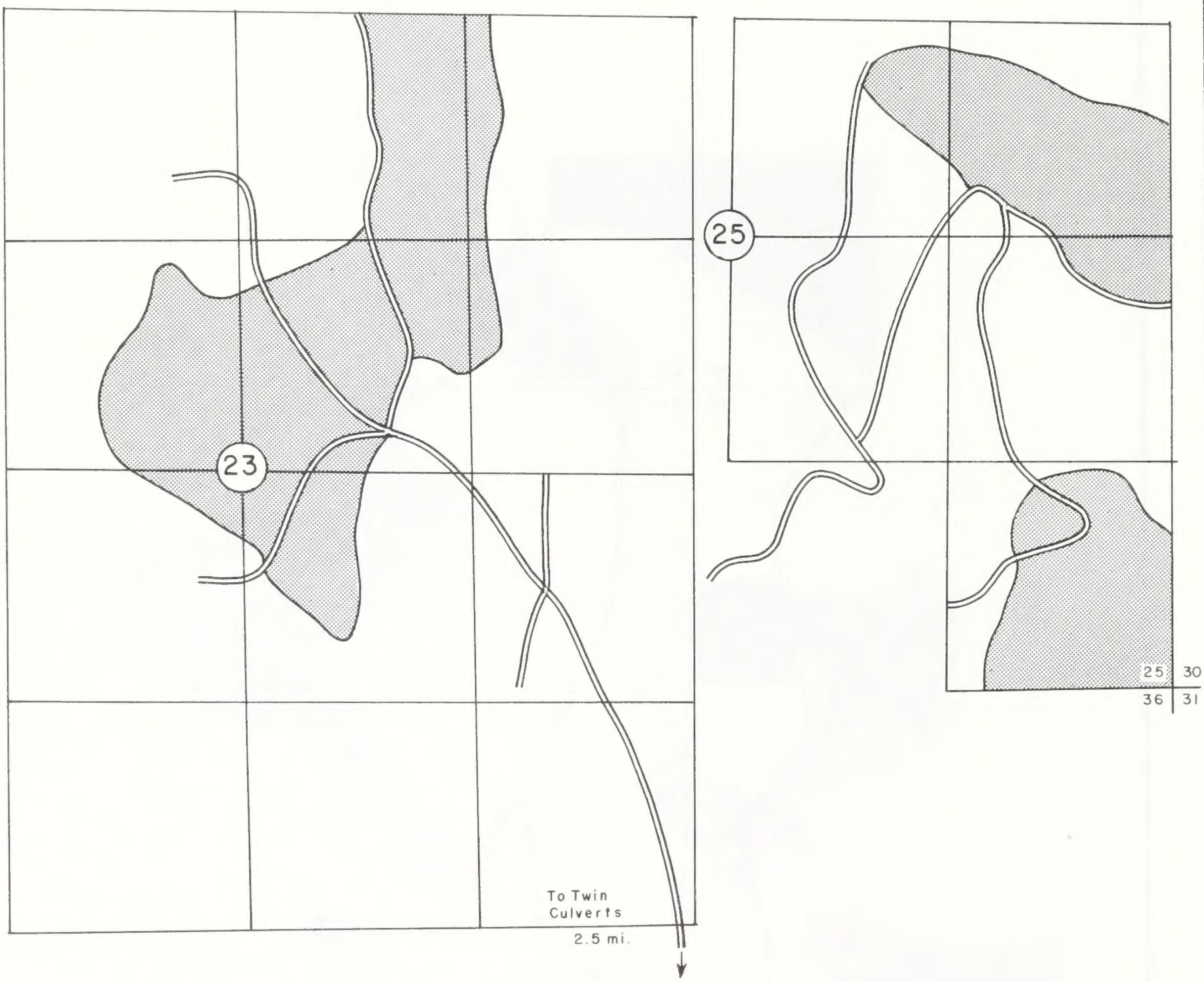
CC Clearcut Area

Existing road

Josephine Proposed Timber Sale Plan
For FY 79

PANTHER RIDGE 79-31

T.31 S., R.9 W., SECS. 23,25



SCALE: 1"= 1000'

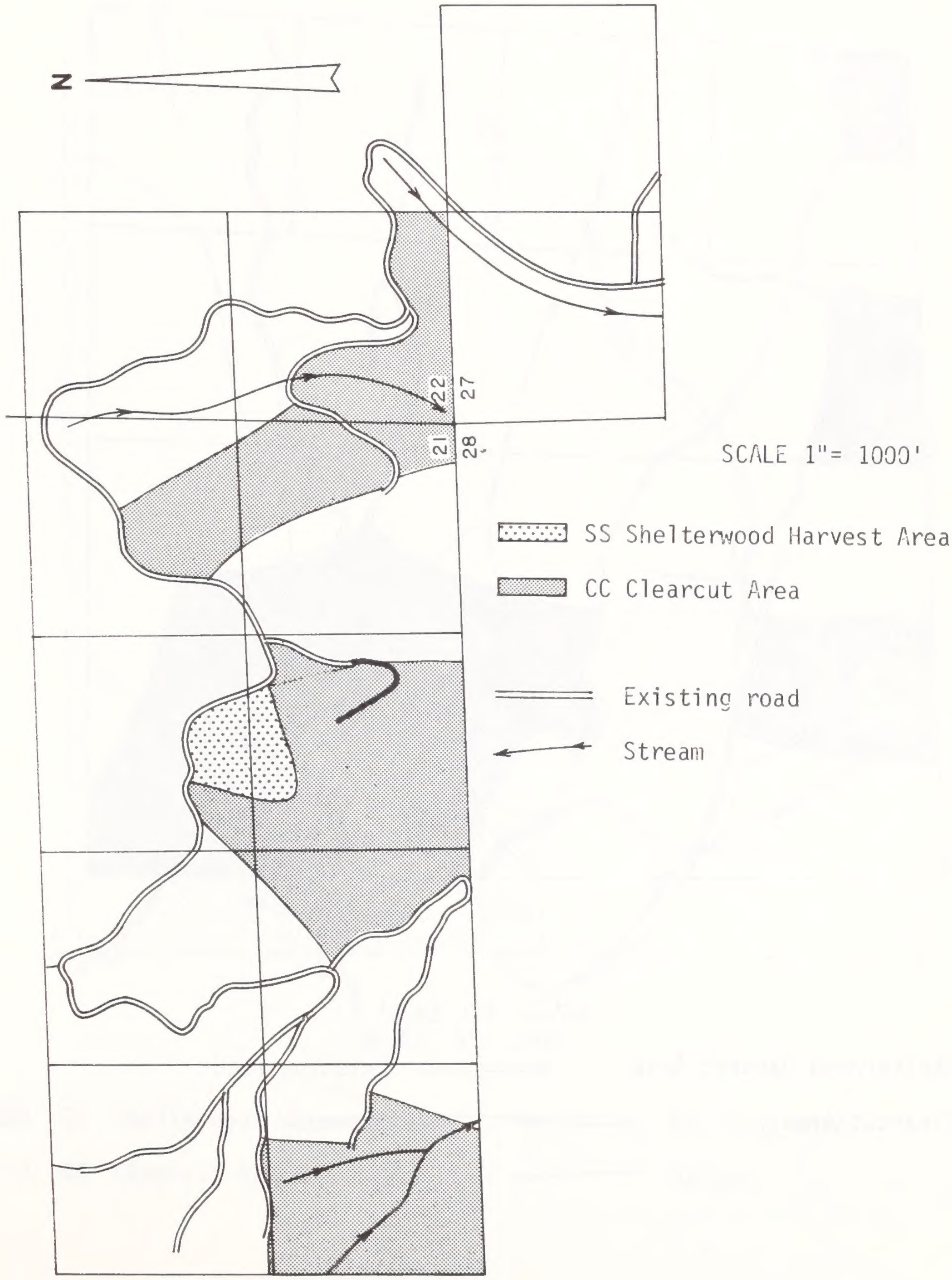
SS Shelterwood Harvest Area — Existing road

CC Clearcut Area

Josephine Proposed Timber Sale Plan
For FY 79

UMP-COW 79-32

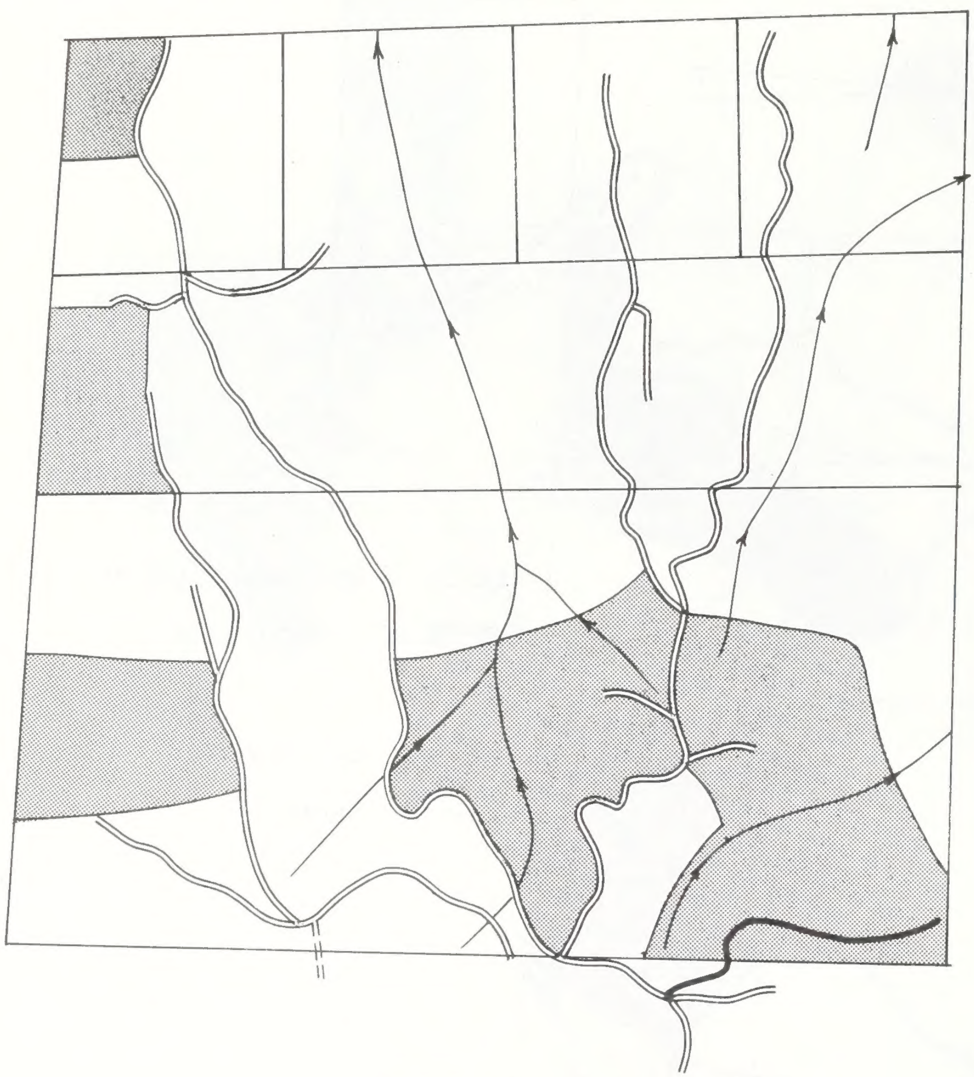
T.31 S., R.4 W., SECS. 21,22,27



Josephine Proposed Timber Sale Plan
For FY 79

ANGEL CAMP 79-33

T.33 S., R.3 W., SEC. 1



SCALE: 1"= 1000'

SS Shelterwood Harvest Area

CC Clearcut Area

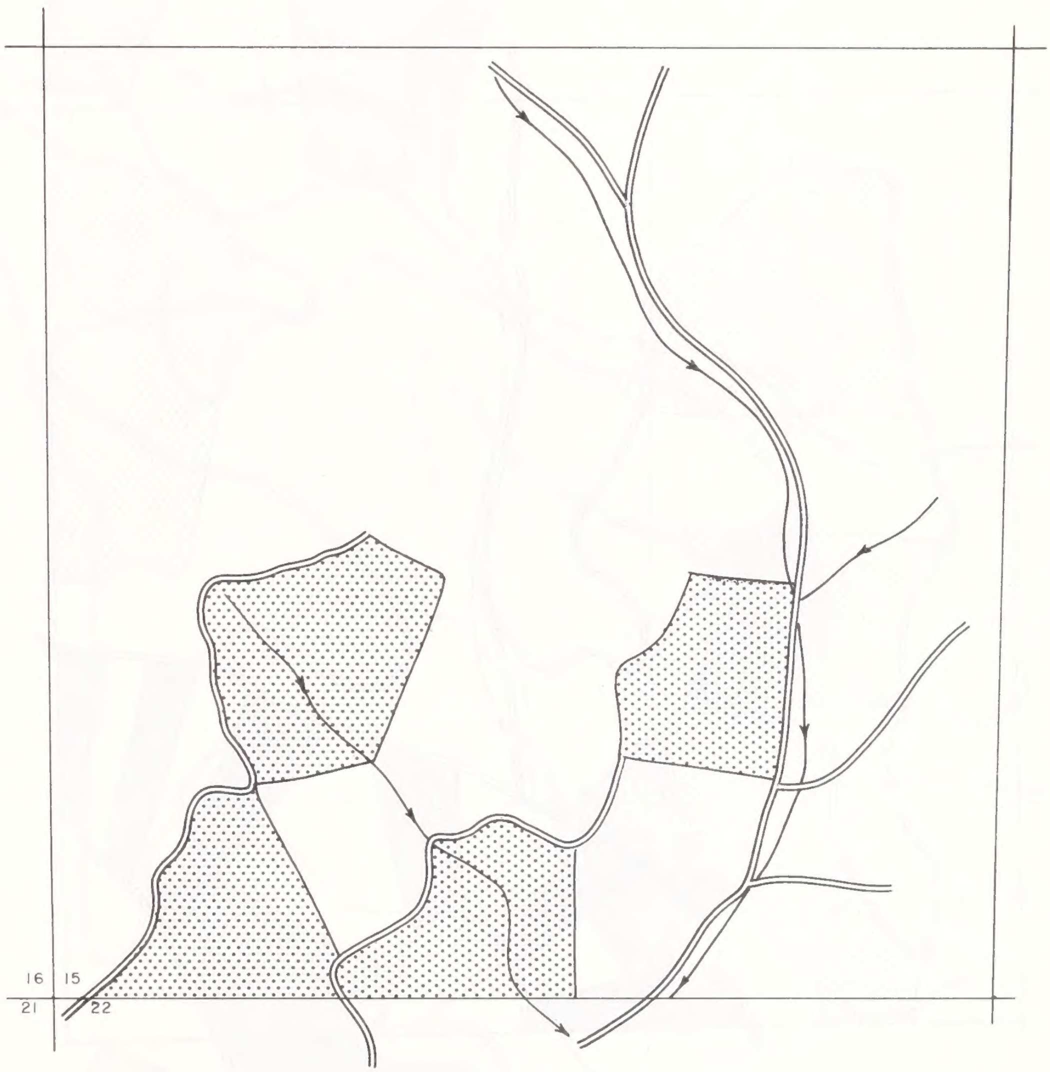
Existing road

Stream

Josephine Proposed Timber Sale Plan
For FY 79

DAD'S CREEK T.S. 79-34

T.32 S., R.7 W., SEC. 15



SCALE: 1"= 1000'

SS Shelterwood Harvest Area

CC Clearcut Area

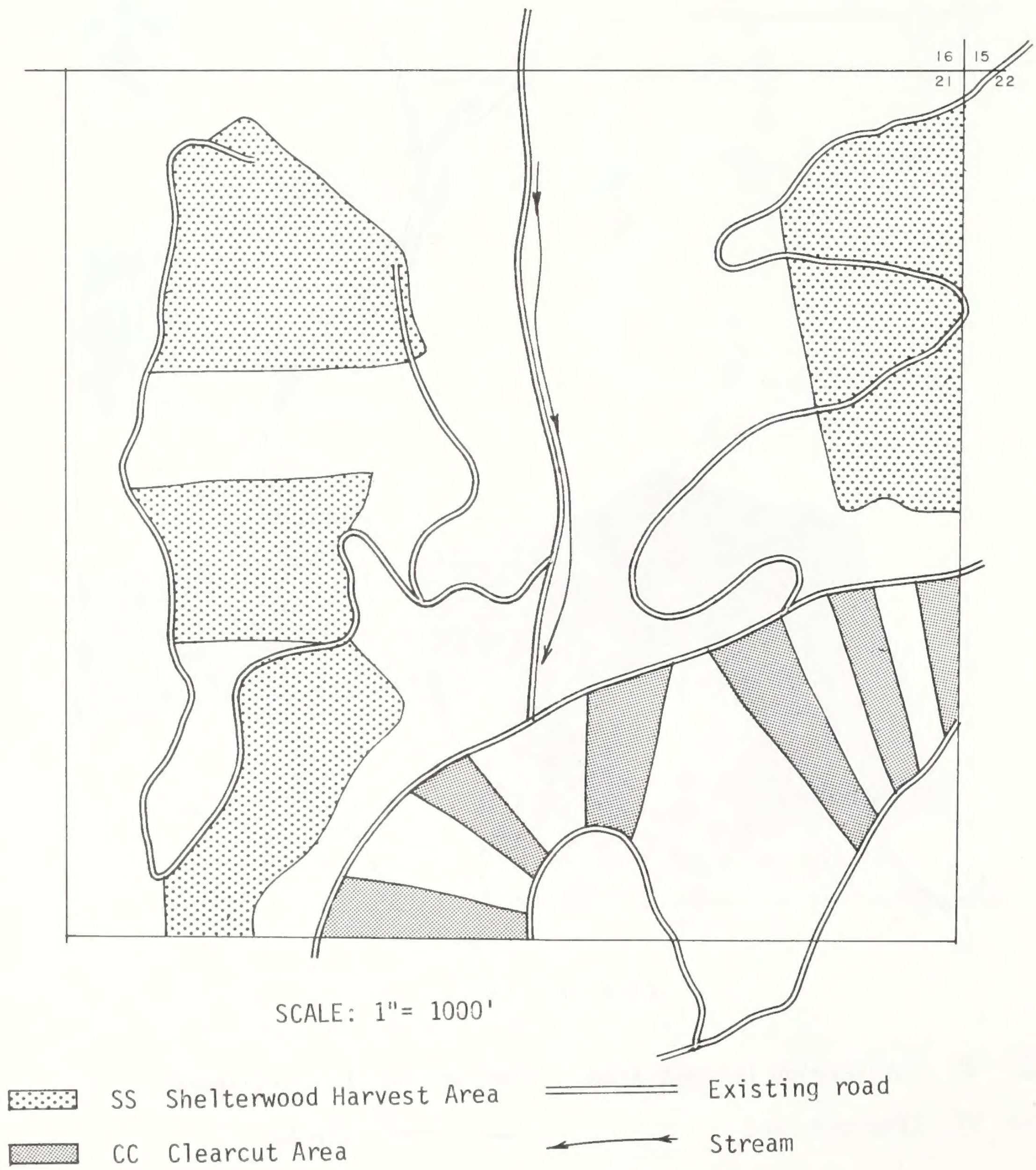
Existing road

Stream

Josephine Proposed Timber Sale Plan
For FY 79

DAD'S CREES T.S. 79-34

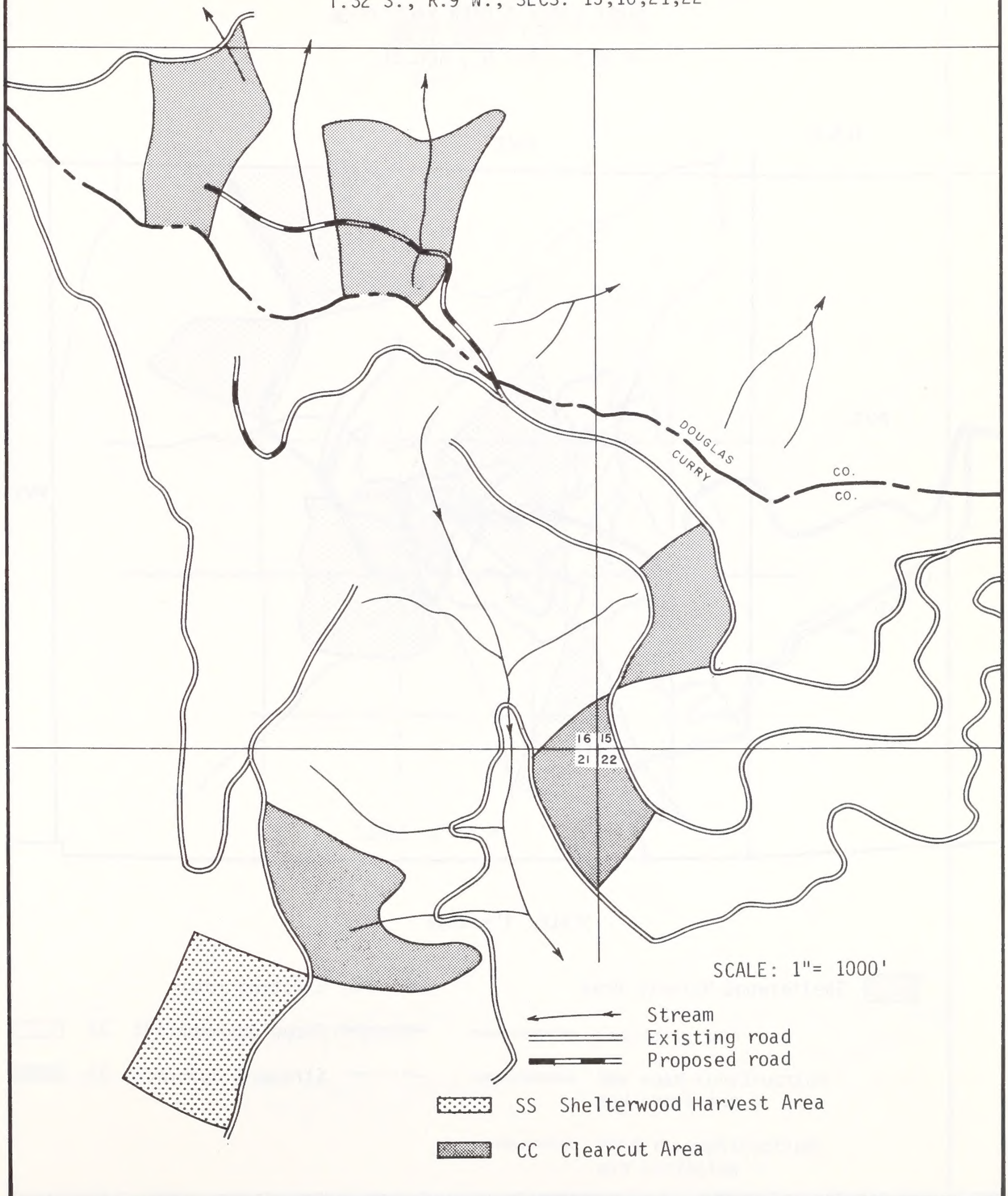
T.32 S., R.7 W., SEC.21



Josephine Proposed Timber Sale Plan For FY 79

COLD SPRINGS T.S.79-35

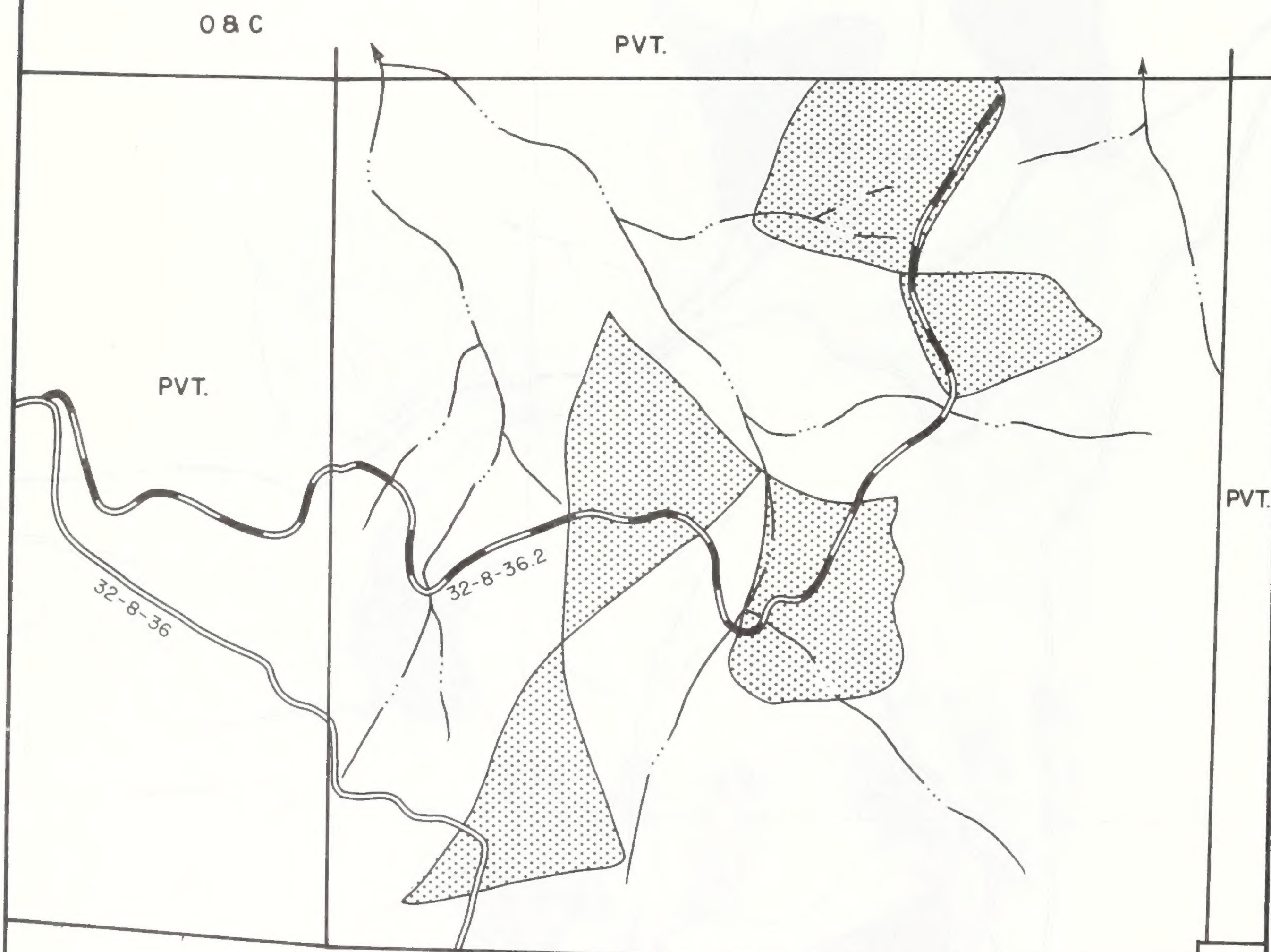
T.32 S., R.9 W., SECS. 15,16,21,22



Proposed Timber Sale Plan
For FY 79

SKULL CREEK TIMBER SALE 79-36

T.32 S., R.7 W., SEC.31



SCALE: 1"= 1000'

Shelterwood Harvest Area

Existing road

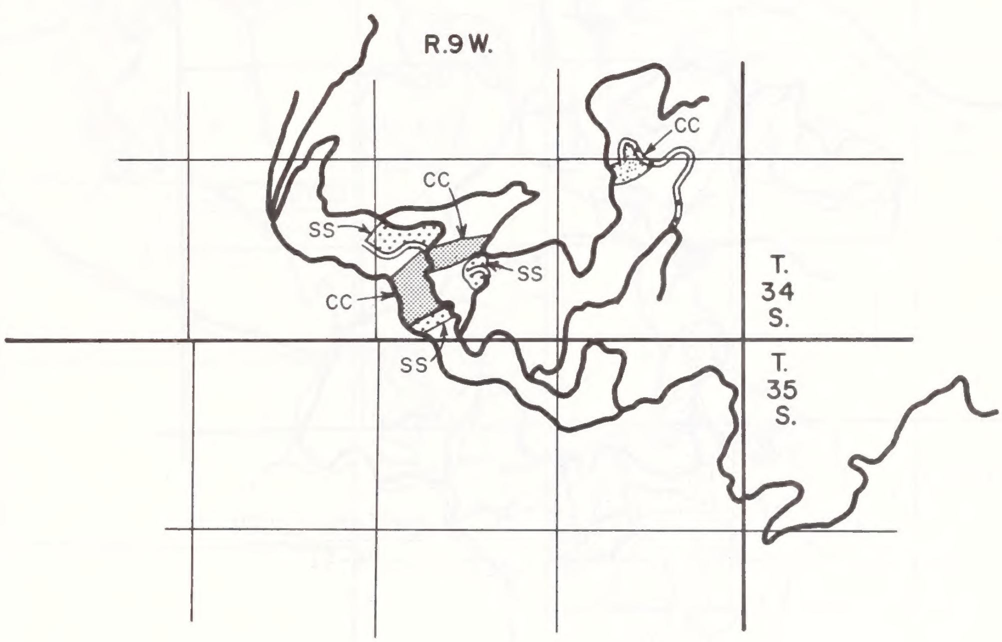
Proposed road

Stream

Josephine Proposed Timber Sale Plan
For FY 79

JULIE CREEK T.S.

79-37



SCALE: 1"=1 mi.

SS Shelterwood Harvest Area

CC Clearcut Area

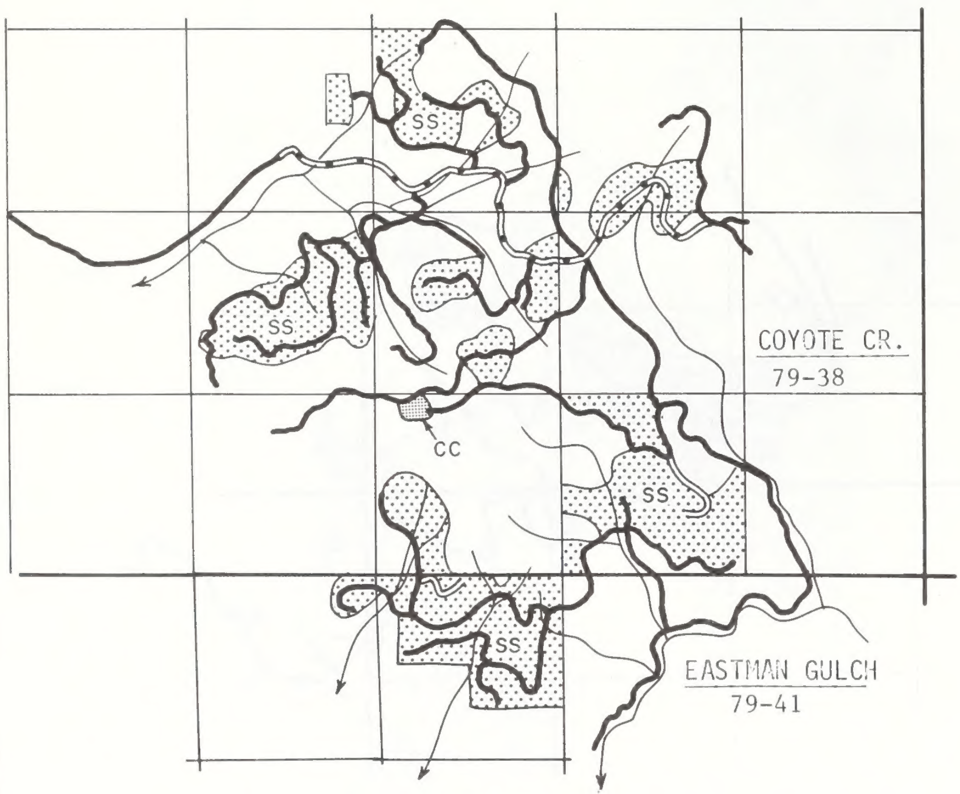
Existing road

New road construction and surfacing

Road re-construction and surfacing

Josephine Proposed Timber Sale Plan
For FY 79

COYOTE CR. & EASTMAN GULCH



SCALE: 1"= 1mi.

SS Shelterwood Harvest Area

CC Clearcut Area

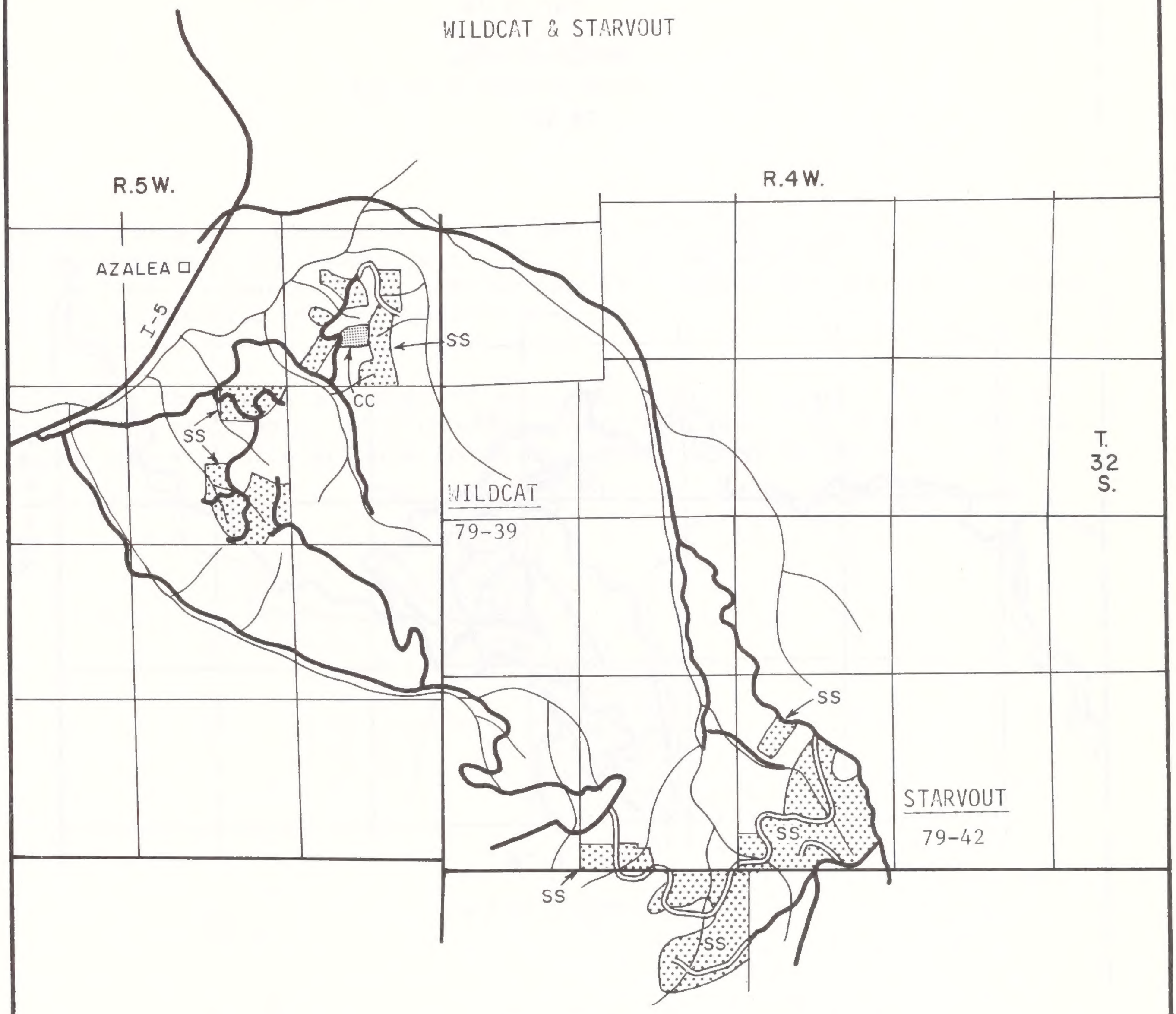
Existing road

New road construction and surfacing

Road re-construction and surfacing

Josephine Proposed Timber Sale Plan
For FY 79

WILDCAT & STARVOUT



SCALE: 1"=1mi.

SS Shelterwood Harvest Area

CC Clearcut Area

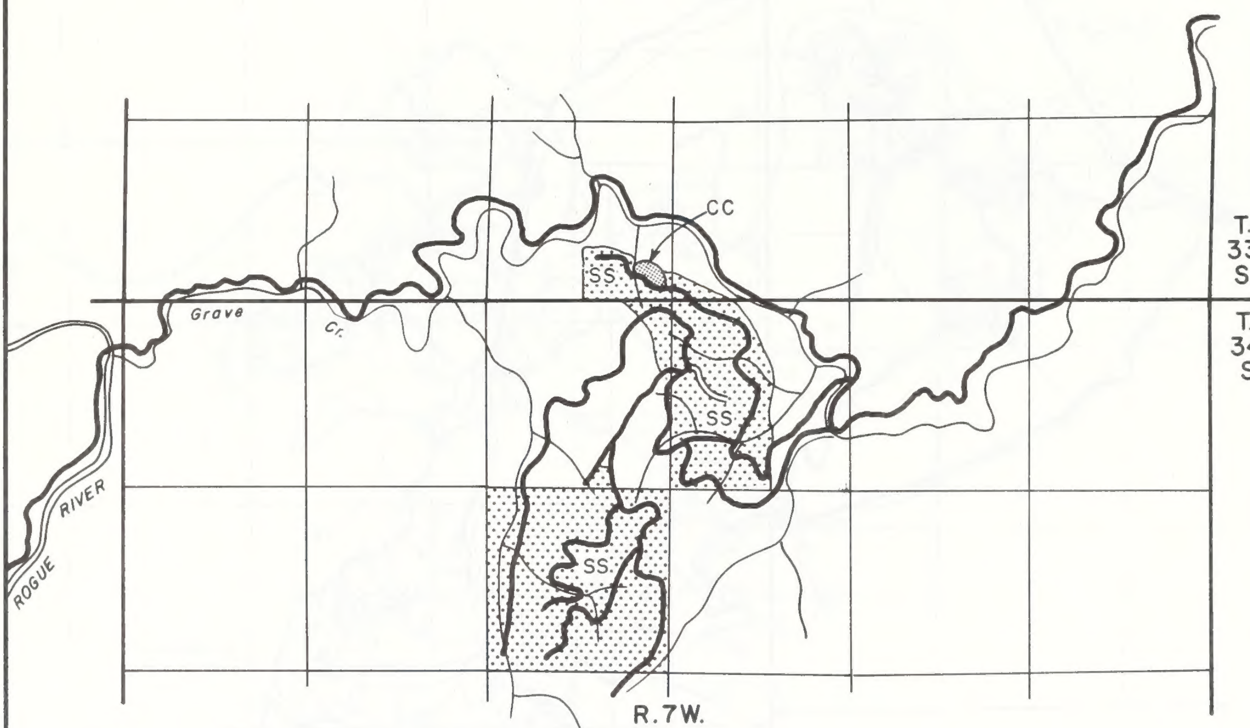
Existing road

New road construction and surfacing

Josephine Proposed Timber Sale Plan
For FY 79

ARCHER-McKNABE

79-40



SCALE: 1"= 1 mi.

SS Shelterwood Harvest Area

CC Clearcut Area

Existing road

New road construction and surfacing

Appendix B

Annual Herbicide Plan

The following is illustrative of an annual herbicide program for the JSYU. It was developed for fiscal year 1978, but not implemented. Table B-1 shows the various treatments, i.e., combinations of chemicals and carrier for target species encountered in each specific area.

Following the table are maps of proposed project areas. Each project map, where applicable, identifies the length of buffered Class I streams, residences, agricultural lands and known domestic water intakes.

Table B-1

JOSEPHINE SYU HERBICIDE PROGRAM PROPOSED FOR 1978

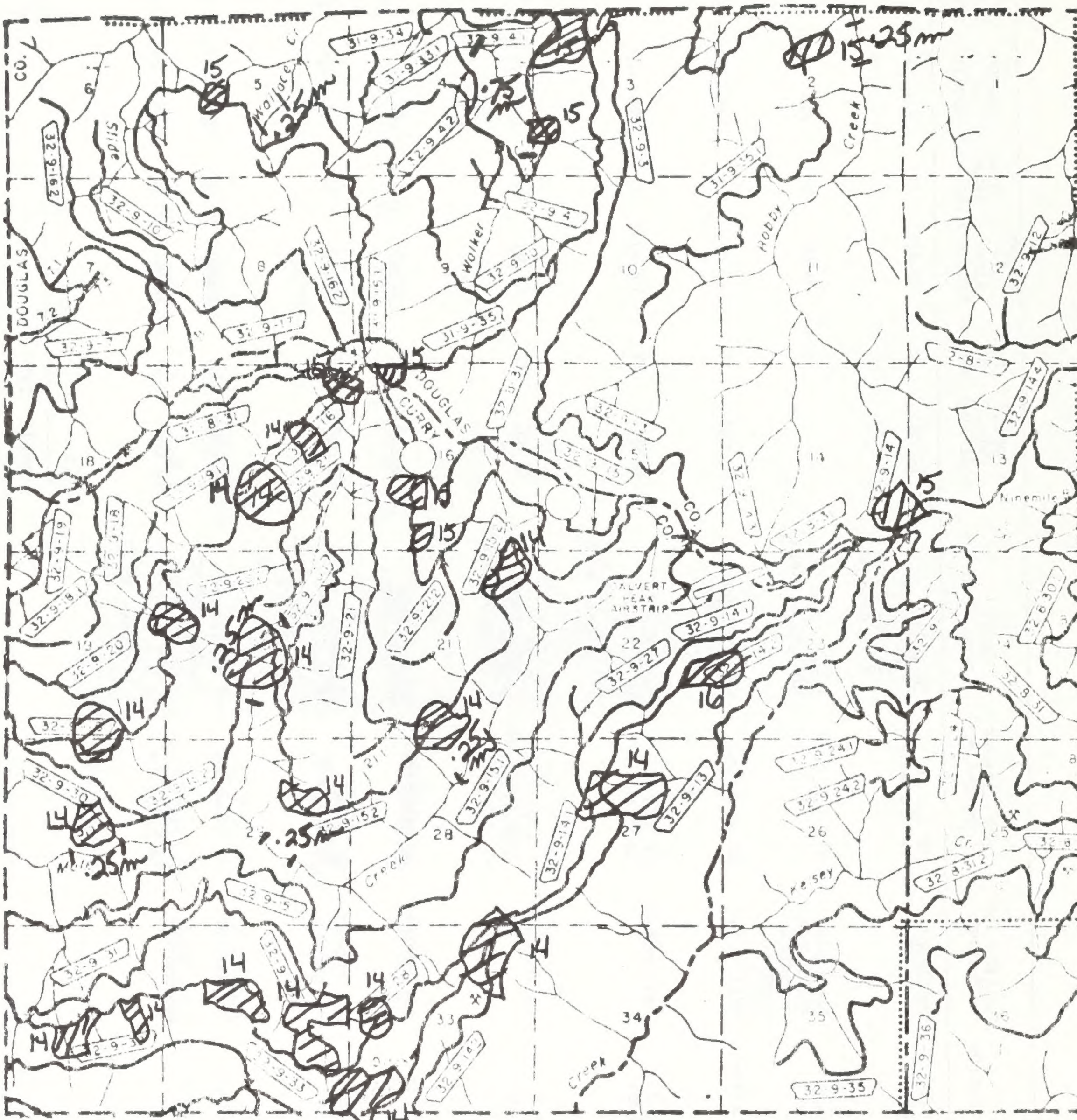
Treat-ment number	Target Pest	Purpose	Herbicide	Application Method	Lbs. Actual Chemical/Ac.	Spray Formulation	Appl. Rate. (gal/ac)	No. of areas	Range of size (acres)	Av. size (acres)	Season of applic.	Total Pounds Chemical	Total Acres
14	madrone manzanita alder, hazel	conifer release	2,4-D Silvex	helicopter	2# 2,4-D 1# 2,4,5-TP	2#'s 2,4-D 1# 2,4,5 -TP 3 qts. fuel oil 8 1/2 gals. water	10 gal.	25	10-60	29	March	2,202	734
15	grass	conifer release	Atrazine	helicopter	4# atrazine	1 gal. atrazine 9 gal. water	10 gal.	17	10-100	58	March	3,940	985
16	madrone, alder, manzanita, ceanothus, rhododendron	conifer release	2,4-D Silvex	helicopter	1 1/2# 2,4-D 1# 2,4,5-TP	1 1/2#'s 2,4-D 1# 2,4,5-TP 9 1/2 gal. water	10 1/2 gal.	19	10-90	64	Aug.	3,032	1,213
19	tanoak, live oak, manzanita, madrone	conifer release	2,4-D Silvex	helicopter	2# 2,4-D 3# 2,4,5-TP	3 qt. diesel 8 1/2 gal. water 2#'s 2,4-D 3#'s 2,4,5-TP	10 gal.	27	10-60	26	Spring	2,100	700
20	hazel, vine maple, bibes, rubus	conifer release	2,4-D Silvex	helicopter	2# 2,4-D 1# 2,4,5-TP	3 qt. diesel 8 1/2 gal. water 2#'s 2,4-D 1# 2,4,5-TP	10 1/2 gal.	12	10-40	24	Spring	864	288
21	ceanothus, chinkapin, tanoak	conifer release	Silvex 2,4-D	helicopter	1# 2,4,5-TP 1 1/2# 2,4-D	10 gal. water 1# 2,4,5-TP 1 1/2# 2,4-D	10 gal.	30	10-60	32	late foliar	2,440	976
22	ceanothus, chinkapin, tanoak, vine maple, alder	conifer release	Silvex 2,4-D	helicopter	2# 2,4,5-TP 2# 2,4-D	8.6 gal. water 1# 2,4,5-TP 2# 2,4-D 3 qt. diesel	10 gal.	12	10-80	40	Spring	1,446	482
23	chinkapin, tanoak, live oak	site prep.	Silvex, 2.4-D	helicopter	1# 2,4,5-TP 3# 2,4-D	8.7 gal. water 1# 2,4,5-TP 3# 2,4-D 2 qt. diesel	10 gal.	1	342	342	late foliar	1,368	342
24	grass, broad-leaf weeds	site prep.	Atrazine	helicopter	5# atrazine	10 gal. water 5# atrazine	10 gal.	6	10-60	24	Spring	735	147
25	alder, maple oak, chapparel manzanita	control stump along right-of-ways	Weedone 170	backpack sprayer	2# 2,4-D	3-4 gal./ 100 gal.	12-15 gal.	9	-	2	June-Sept.	40	20
26	alder, maple, oak, madrone manzanita, chaparrel	control brush along right-of-way	Krenite	vehicle mounted sprayer	4# Krenite	1-1/2 gal. Krenite 1 gal. surfactant to 100 gal. water	50-300 gals.	road sides	-	-	Aug.-Sept.	240	20

Table B-1 (continued)

Treatment number	Target Pest	Purpose	Herbicide	Application Method	Lbs. Actual Chemical/Ac.	Spray Formulation	Appl. Rate. (gal/ac)	No. of areas	Range of size (acres)	Av. size (acres)	Season of applic.	Total Pounds Chemical	Total Acres
27	tanoak, salal, manzanita, rhododendron, chinkapin, ocean spray	site prep.	2,4-D Silvex	helicopter	3# 2,4-D 1# 2,4,5-TP	3# 2,4-D 1# 2,4,5-TP 2 qts. fuel oil 8.70 gal. water	10 gal.	4	10-40	17	Feb.-Mar.	264	66
28	live oak, chinkapin, madrone, tanoak	thinning basal treat-ment	Silvex	hand axe, chain saw, knapsack sprayer	12# 2,4,5-TP	3 gal. 2,4,5-TP/ 100 gals. diesel	-	6	10-40	15	Apr.-Aug.	1,080	90
29	grass	conifer release, site prep.	Atrazine	helicopter	4# atrazine	4# atrazine 10 gal water	10 gal.	1	26	26	Feb.-Mar.	104	26
30	manzanita, tan oak, salal, rhodendron, chinkapin, oceanspray	conifer release	2,4-D Silvex	helicopter	2# 2,4-D 1# 2,4,5-TP	2# 2,4-D 1# 2,4,5-TP 3 qts. fuel oil 8 1/2 gal. water	10 gal.	29	10-40	31	Mar.-Ap.	2,664	888
31	manzanita, tan oak, salal, rhodendron, chinkapin, oceanspray	conifer release	2,4-D Silvex	helicopter	1 1/2# 2,4-D 1/2# 2,4,5-TP	1 1/2# 2,4-D 1# 2,4,5-TP 9 1/2 gal. water	10 gal.	27	10-60	42	Sep.-Oct	2,865	1,146
32[1]	grass	conifer release	Atrazine	helicopter	4# atrazine	4# atrazine 10 gal. water	10 gal.	4	10-40	115	Feb.-Mar.	2,305	461
32[1]	manzanita, tan oak, salal, rhodendron, chinkapin, oceanspray	conifer release	2,4-D Silvex	helicopter	2# 2,4-D 1# 2,4,5-TP	2# 2,4-D 1# 2,4,5-TP 8 1/2 gal. water 3 qt. diesel	10 gal.	4	10-40	115	Feb.-Ap.	1,383	461
33[2]	grass	conifer release	Atrazine	helicopter	4# atrazine	4# atrazine 10 gal. water	10 gal.	6	10-40	24	Sep.-Oct.	576	144
33[2]	manzanita, tan oak, salal, rhodendron, chinkapin, oceanspray	conifer release	2,4-D Silvex	helicopter	1 1/2# 2,4-D 1# 2,4,5-TP	1 1/2# 2,4-D 1# 2,4,5-TP 9 1/2 gal. water	10 gal.	6	10-60	24	Sep.-Oct.	360	144
							Total	235				30,008	8,728

1/ two separate treatments on same area
2/ two separate treatements on same area

T.32 S., R.9 W.
ANAKTURUK SADDLE



LEGEND

|.Xm| Class I Stream

Ag Agriculture Land

R Residences

Domestic Water Intake

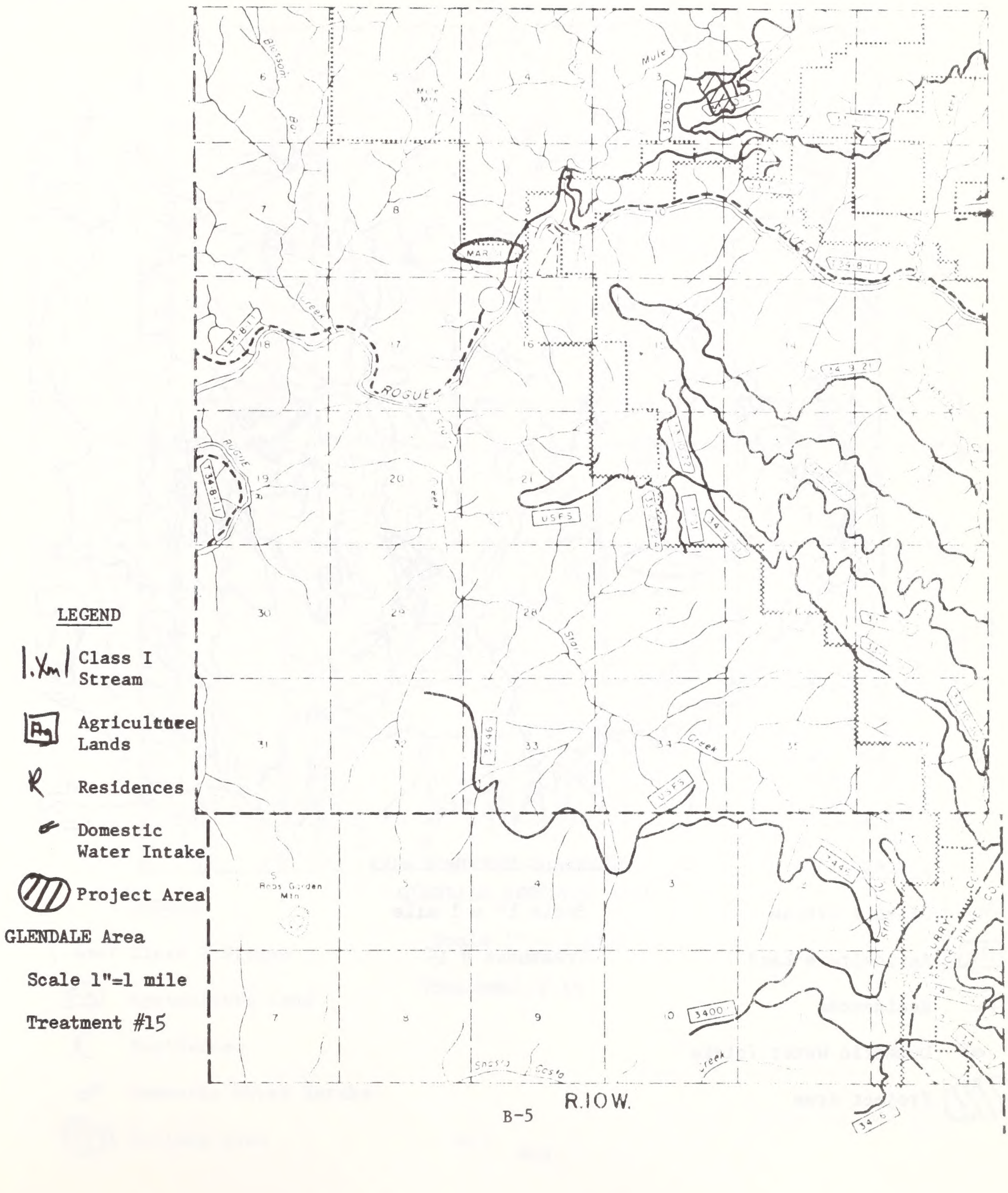
Project Area

GLENDALE RESOURCE AREA

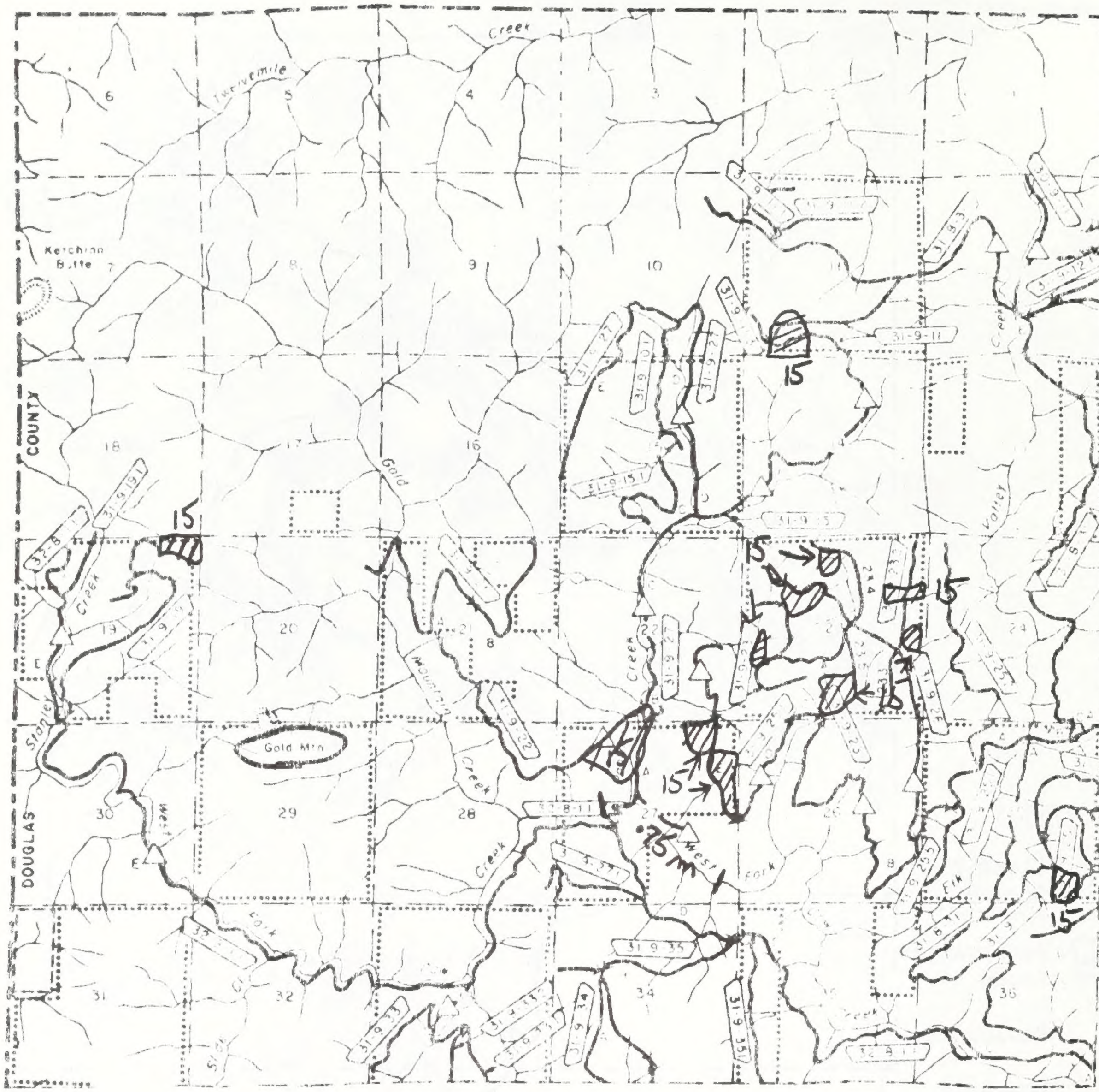
Scale 1" = 1 mile

Treatments #14,15,&16

T.33 S., R.10 W.
MARIAL



T.31 S., R.9 W.
GOLD MTN.



LEGEND

| .Xm | Class I Stream

[Ag] Agriculture Land

R Residences

Domestic Water Intake

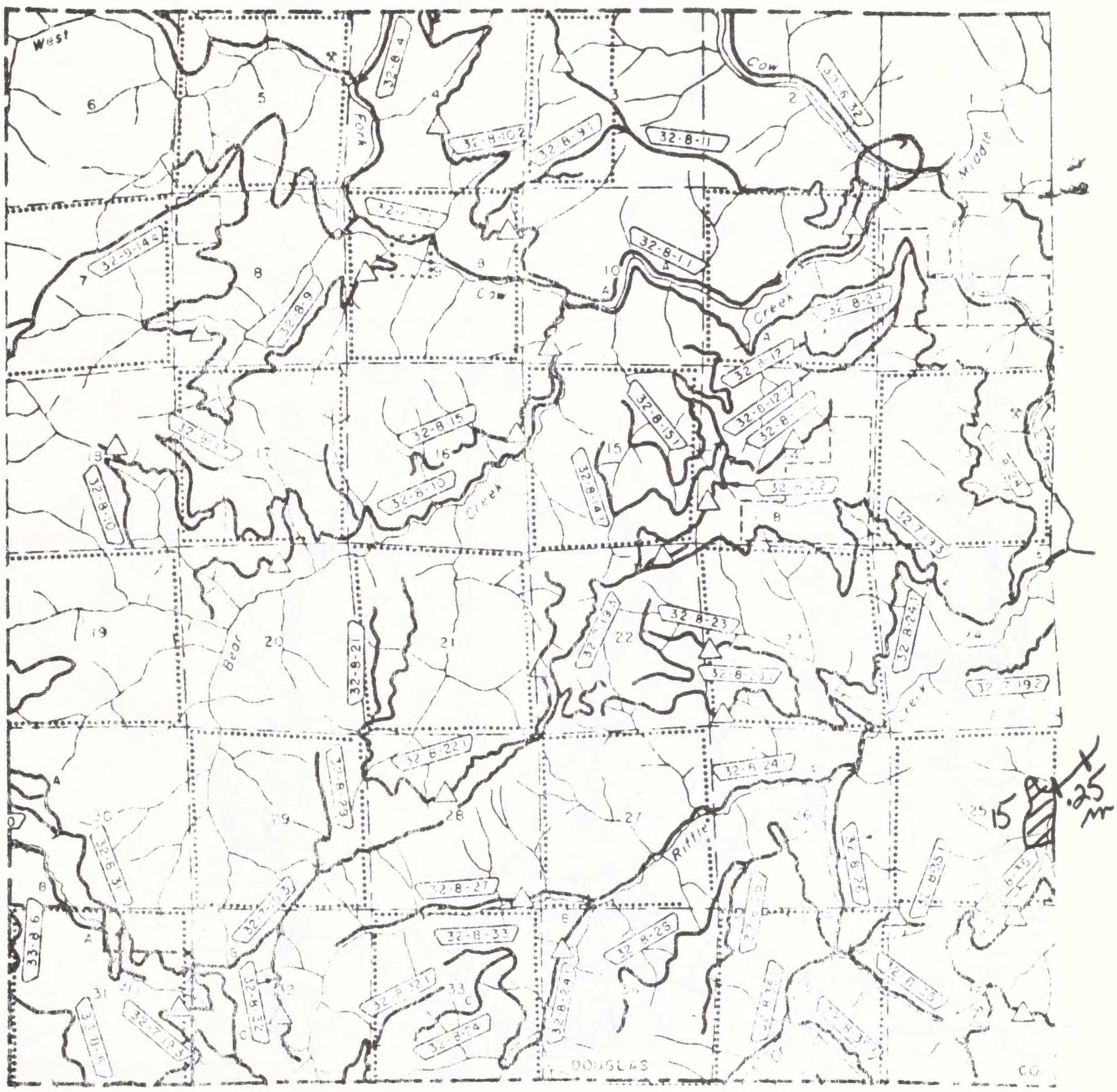
Project Area

GLENDALE RESOURCE AREA

Scale 1" = 1 mile

Treatment # 15

T.32 S., R.8 W.
WEST FORK COW CREEK MOUTH



GLENDALE RESOURCE AREA

Scale 1" = 1 mile

Treatment # 15

LEGEND

1.Xm Class I Stream

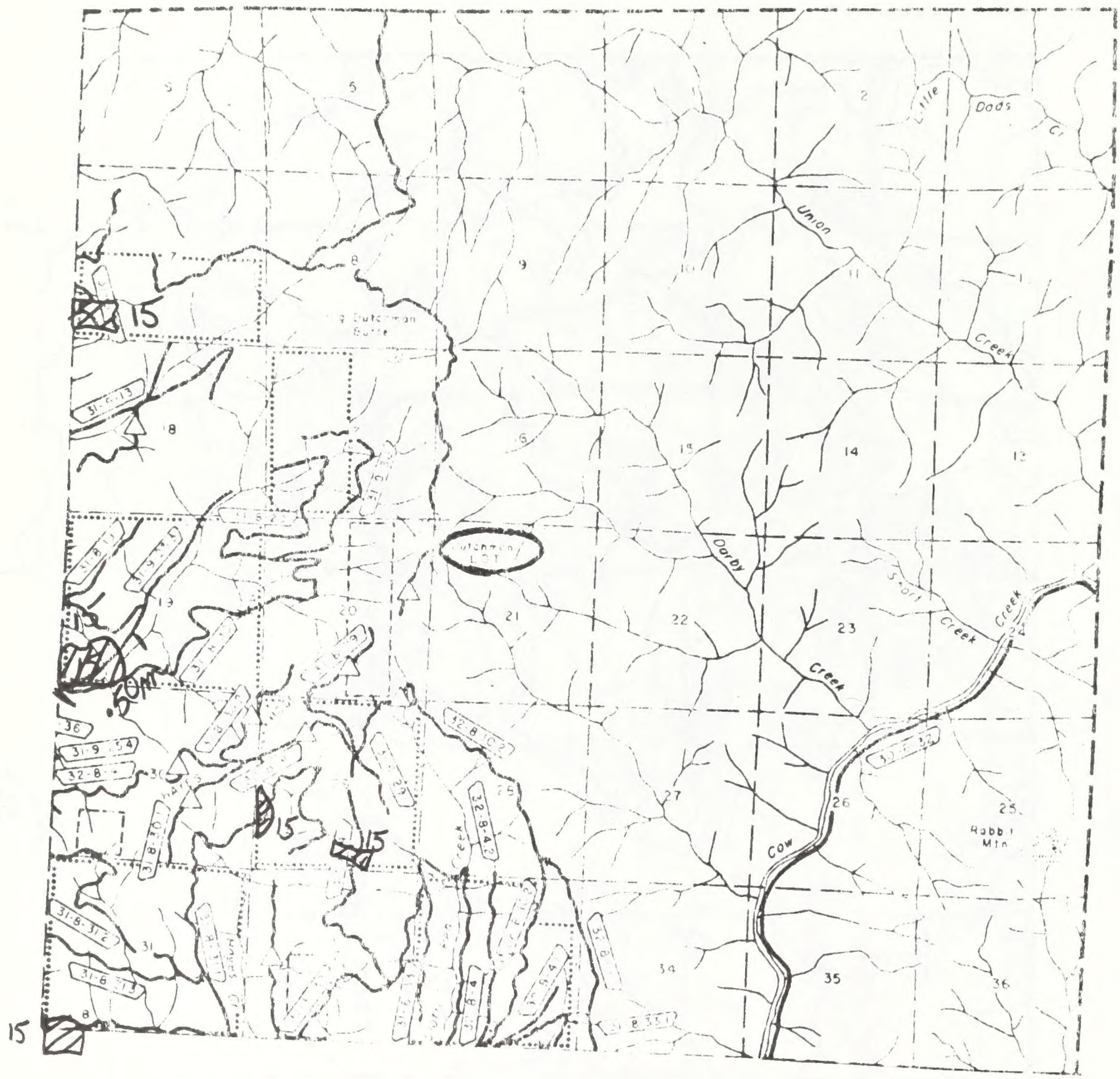
Ag Agriculture Land

R Residences

Domestic Water Intake

Project Area

T.31 S., R.8 W.
DUTCHMAN BUTTE



LEGEND

1.Xm Class I Stream

Ag Agriculture Land

R Residences

Domestic Water Intake

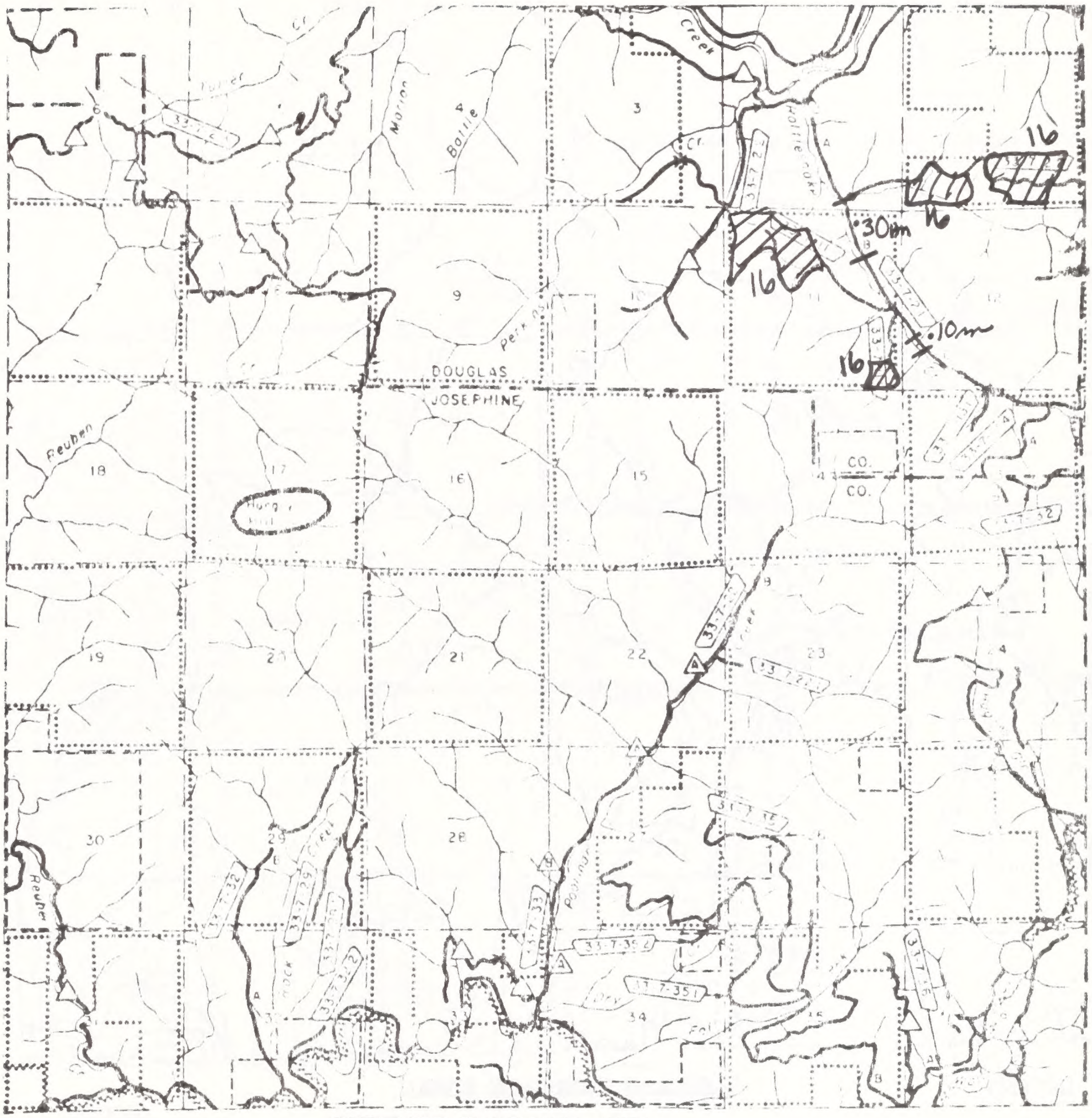
Project Area

GLENDALE RESOURCE AREA

Scale 1" = 1 mile

Treatment # 15

T.33 S., R.7 W.
HUNGRY HILL



GLENDALE RESOURCE AREA

Scale: 1" = 1 mile

Treatment # 16

LEGEND

1.Xm | Class I Stream

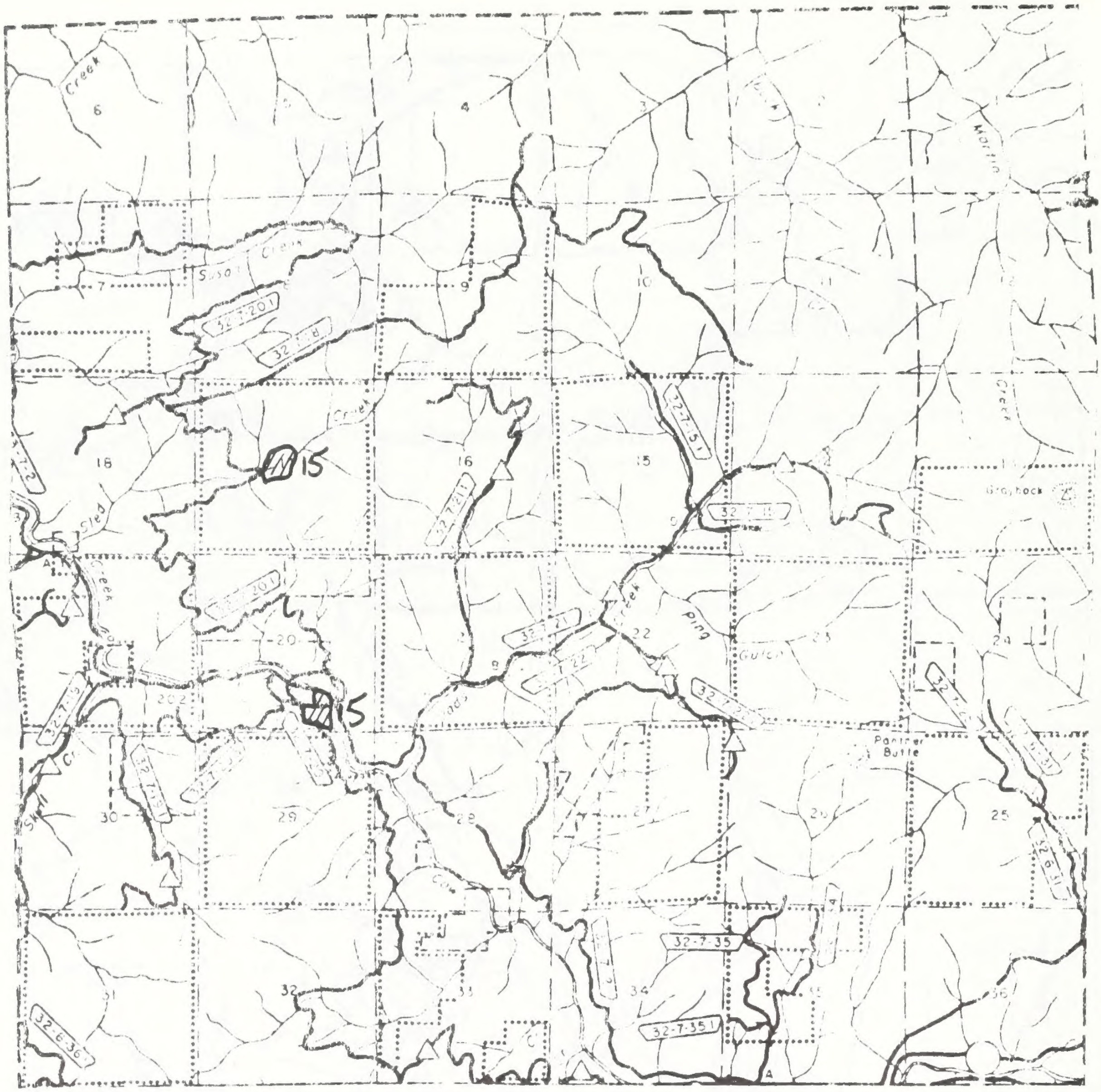
Ag Agriculture Land

R Residences

Domestic Water Intake

Project Area

T.32 S., R.7 W.
BRANDT CROSSING (COW CREEK)



GLENDALE RESOURCE AREA

Scale 1" = 1 mile

Treatment # 15

LEGEND

Class I Stream

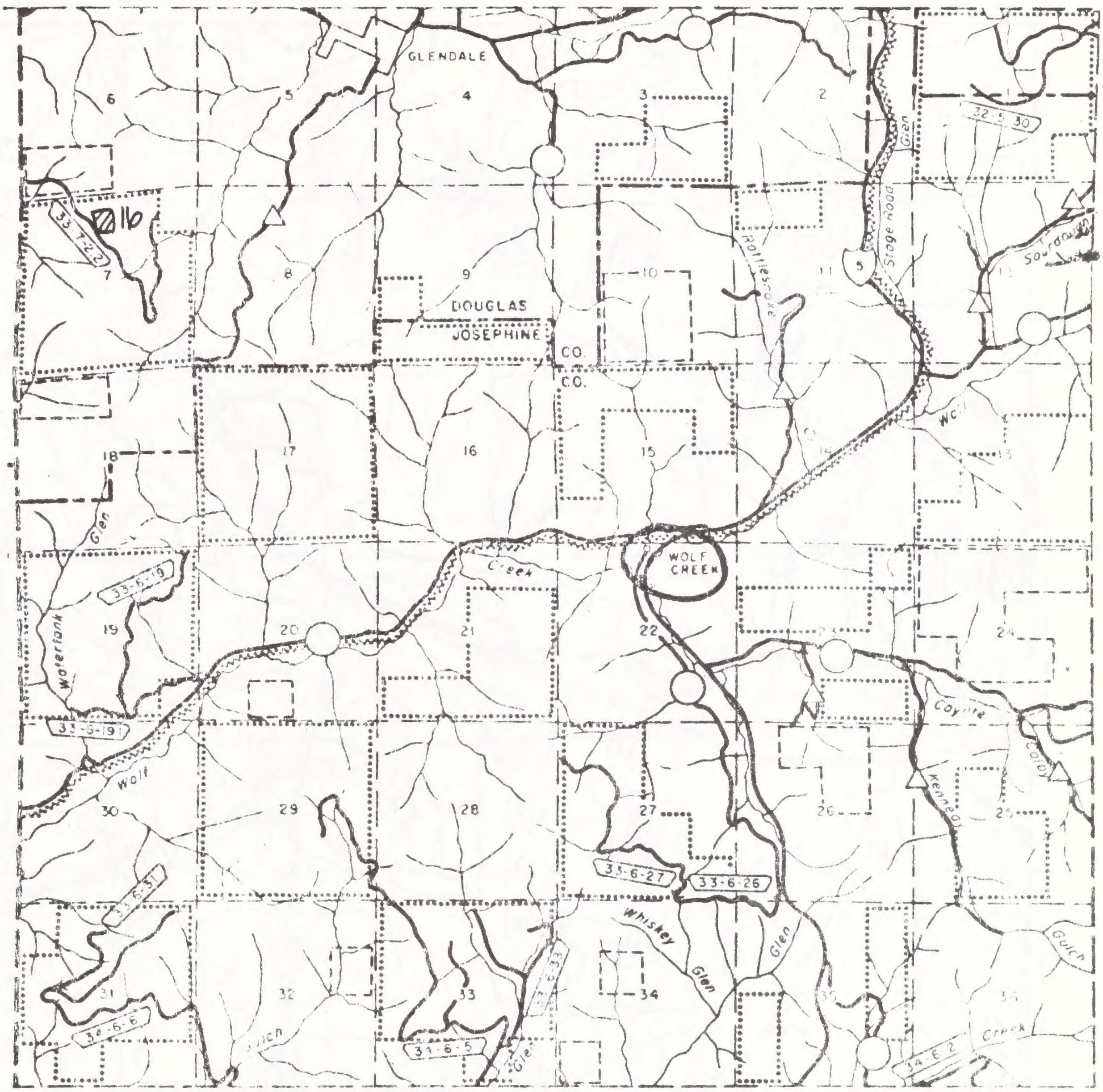
Ag — Agriculture Land

R — Residences

Domestic Water Intake

Project Area

T.33 S., R.6 W.
WOLF CREEK



GLENDALE RESOURCE AREA

Scale: 1" = 1 mile

Treatment # 16

LEGEND

1.Xm Class I Stream

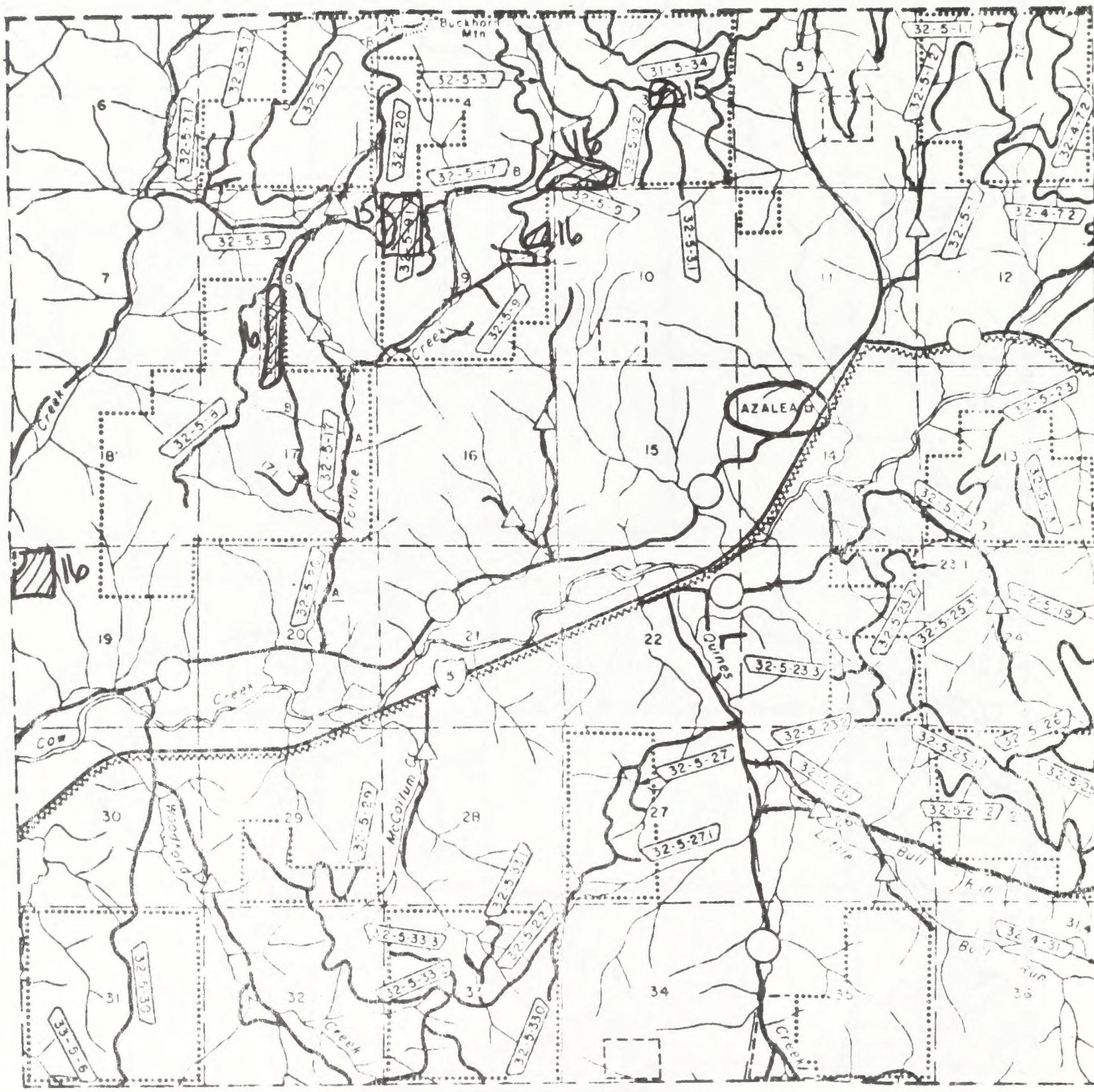
Ag Agriculture Land

R Residences

Domestic Water Intake

Project Area

T.32 S., R.5 W.
AZALEA



LEGEND

GLENDALE RESOURCE AREA

Class I Stream

Scale 1" = 1 mile

Agriculture Land

Treatments # 15&16

Residences

Domestic Water Intake

Project Area

T.32 S., R.4 W.
GREEN MTN.

LEGEND

1.Xm Class I Stream

Ag Agriculture Land

R Residences

Domestic Water Intake

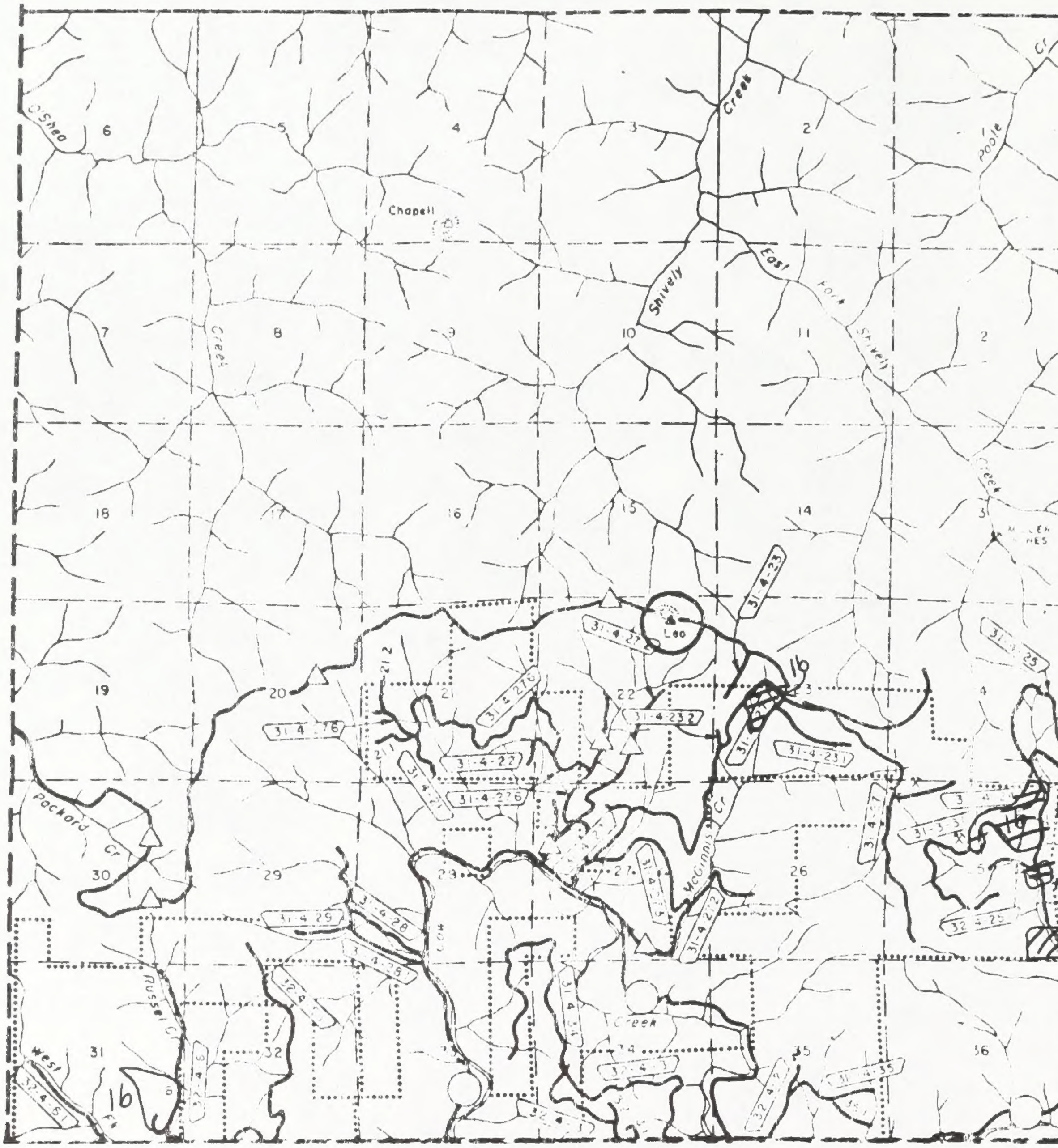
Project Area

GLENDALE RESOURCE AREA

Scale 1" = 1 mile

Treatments # 14,15&16

T.31 S., R.4 W.
LEO



LEGEND

GLENDALE RESOURCE AREA

Class I Stream

Agriculture Land

Residences

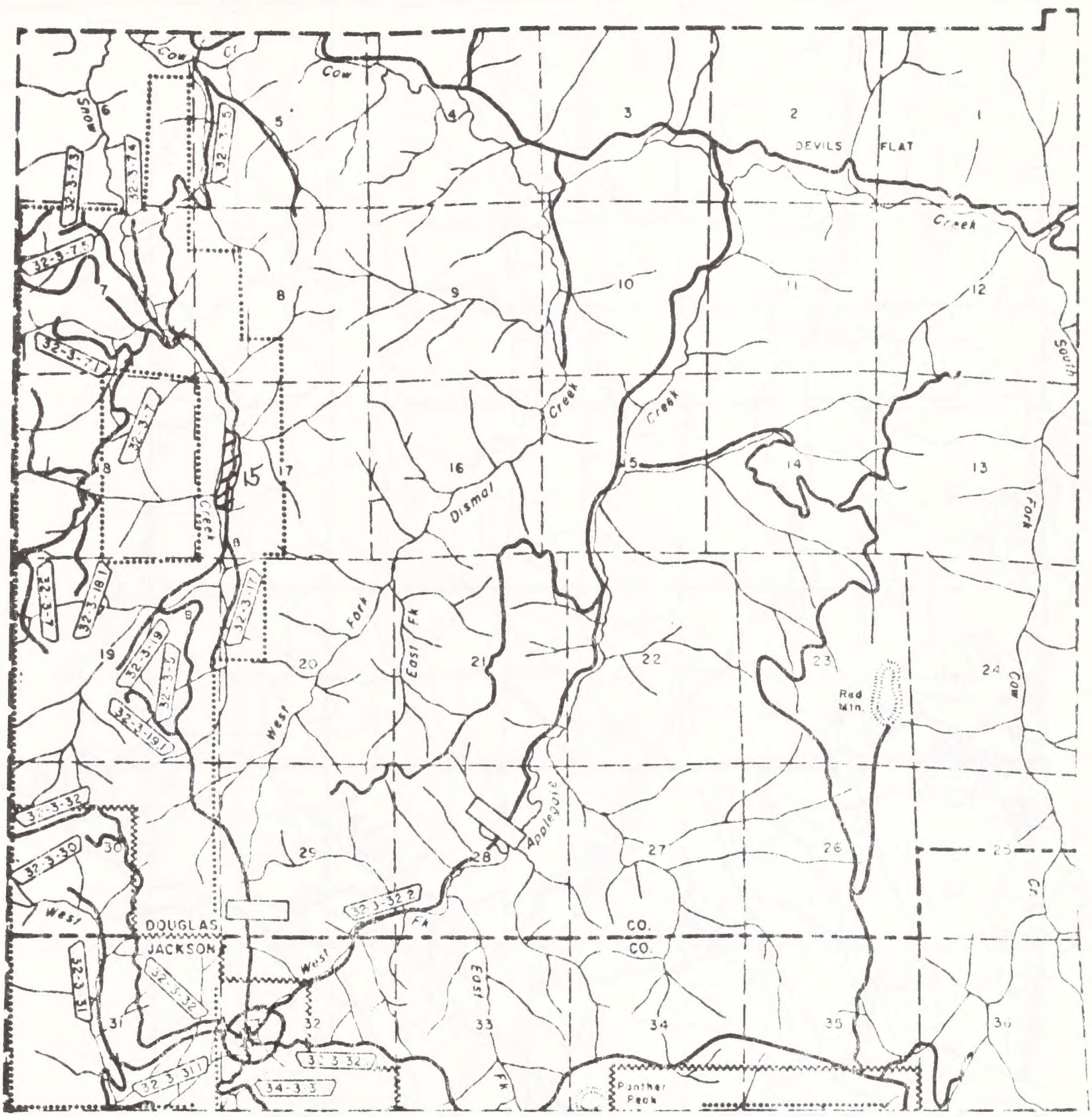
Domestic Water Intake

Project Area

Scale 1" = 1 mile

Treatments # 15 & 16

T.32 S., R.3 W.
GOOLAWAY GAP



LEGEND

1.Xm Class I Stream

Ag Agriculture Land

R Residences

Domestic Water Intake

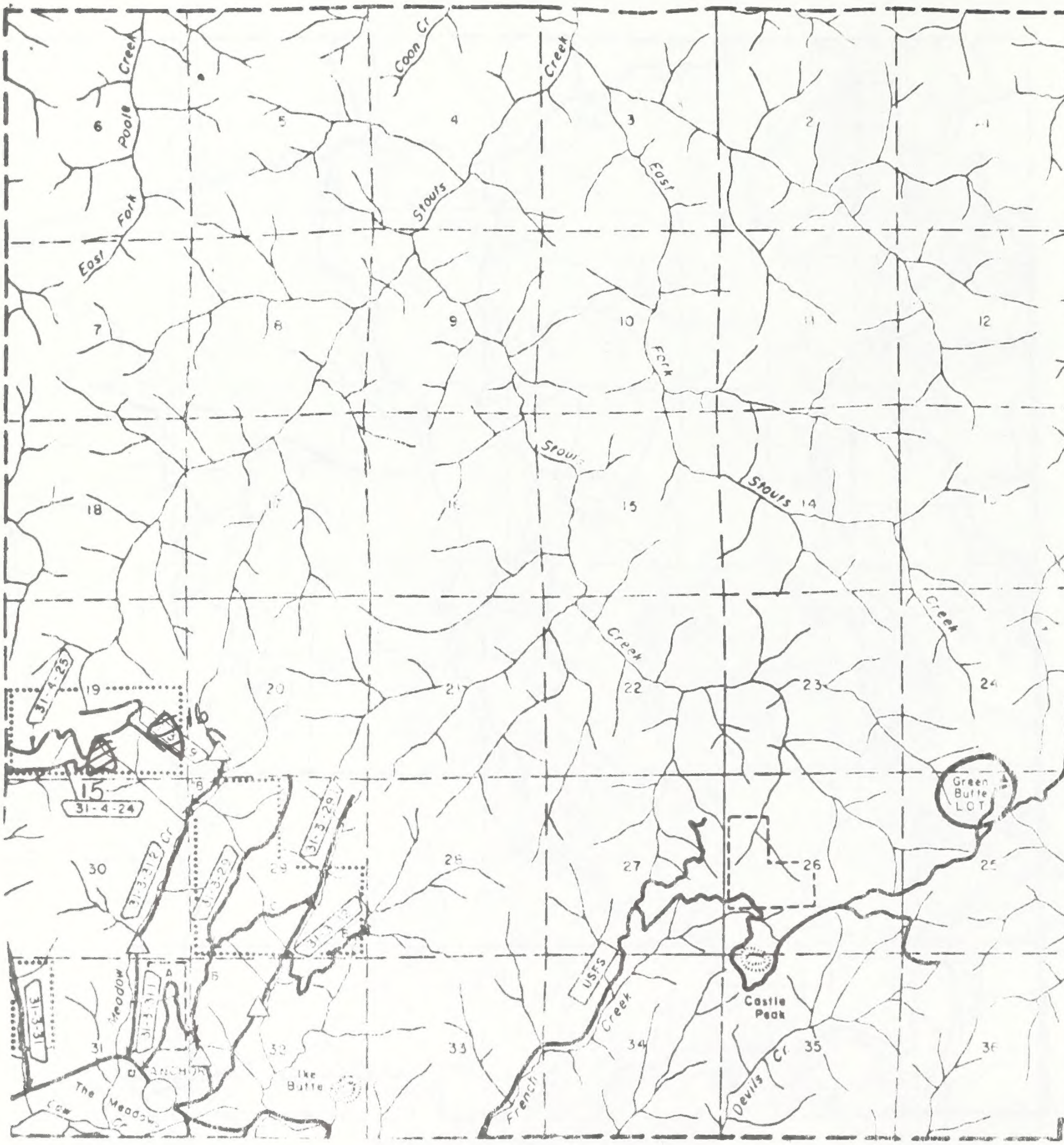
Project Area

GLENDALE RESOURCE AREA

Scale 1" = 1 mile

Treatment #15

T.31 S., R.3 W.
GREEN BUTTE



LEGEND

Class I Stream

Agriculture Land

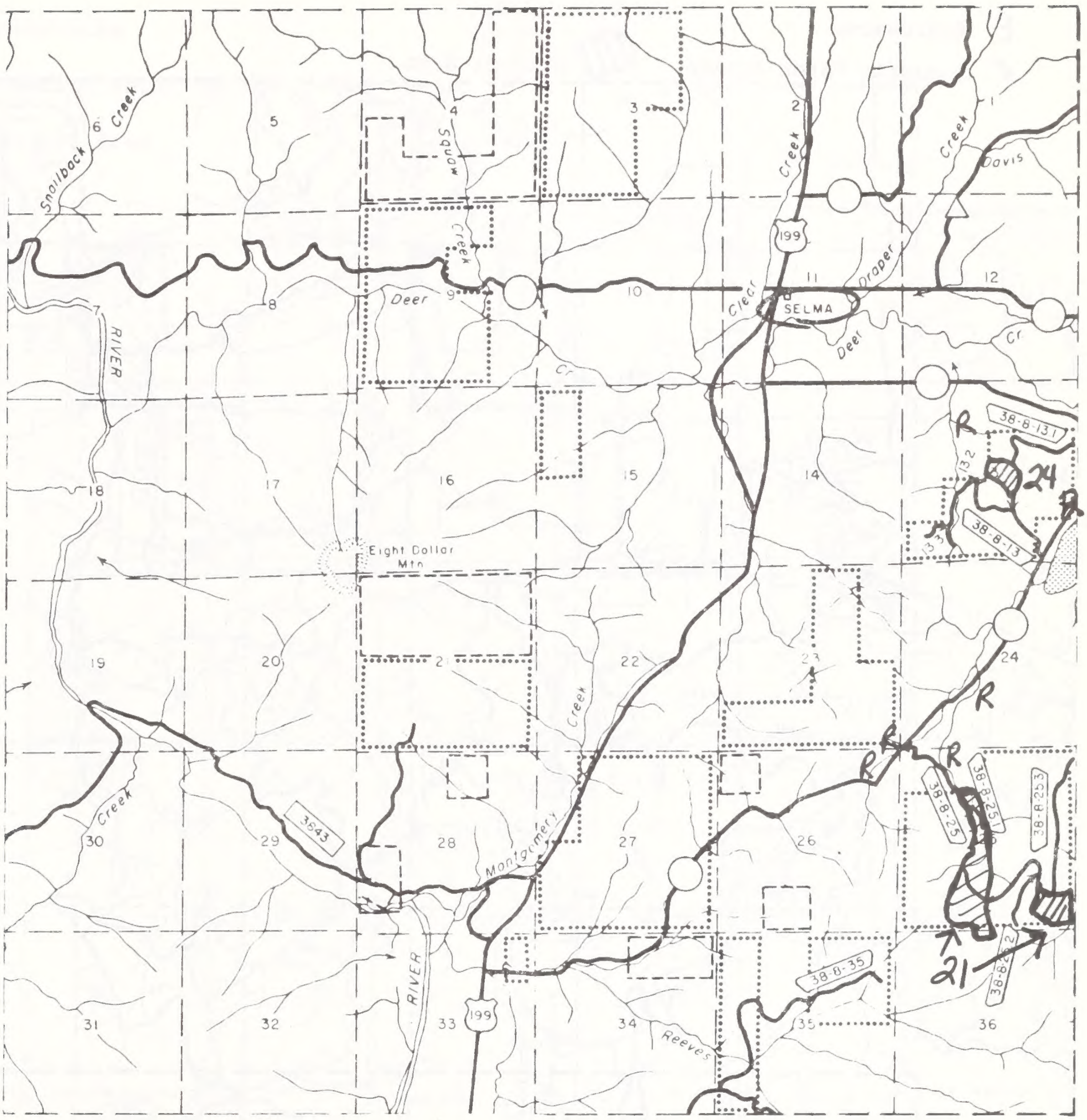
Residences

Domestic Water Intake

Project Area

GLENDALE RESOURCE AREA
Scale 1" = 1 mile
Treatments #15&16

T.38 S., R.8 W.
SELMA



LEGEND

| .Xm | Class I Stream
Ag Agriculture Land
R Residences
Domestic Water Intake
Project Area

GRANTS PASS RESOURCE AREA

Scale: 1" = 1 mile

Treatments # 21 & 24

LEGEND

Class I Stream

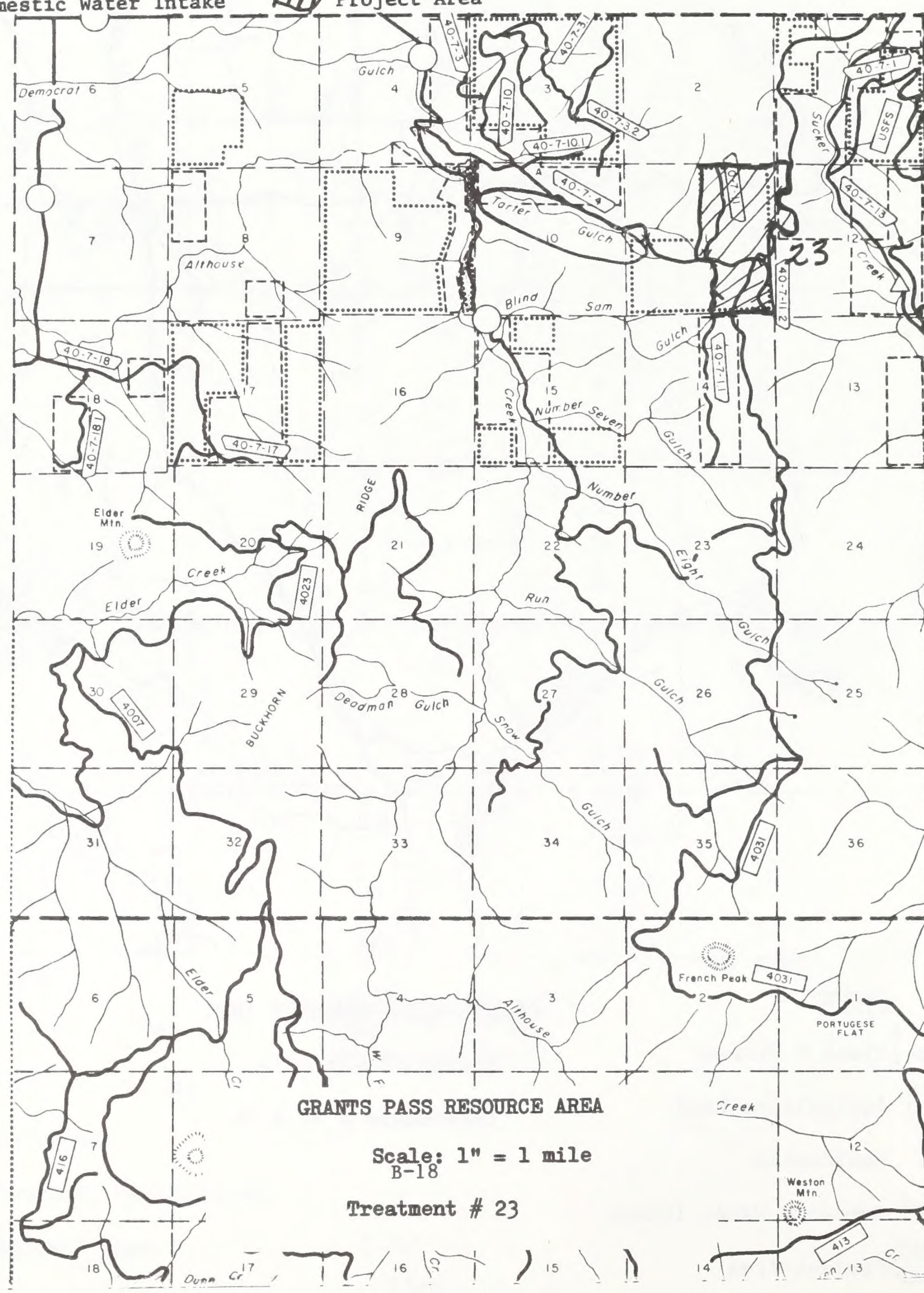
Agriculture Land

Residences

Domestic Water Intake

Project Area

T.40 & 41 S., R.7 W.
TARTER GULCH



GRANTS PASS RESOURCE AREA

Scale: 1" = 1 mile

Treatment # 23

LEGEND

Class I Stream

Agriculture Land

Residences

Domestic Water Intake

Project Area

T.38 S., R.7 W.
SELMAC LAKE

GRANTS PASS RESOURCE AREA

Scale: 1" = 1 mile

Treatments # 19,20 & 21

T.39 S., R.6 W.
RABBIT LAKE

LEGEND

1.Xm| Class I Stream

Ag Agriculture Land

R Residences

Domestic Water Intake

Project Area

GRANTS PASS RESOURCE AREA

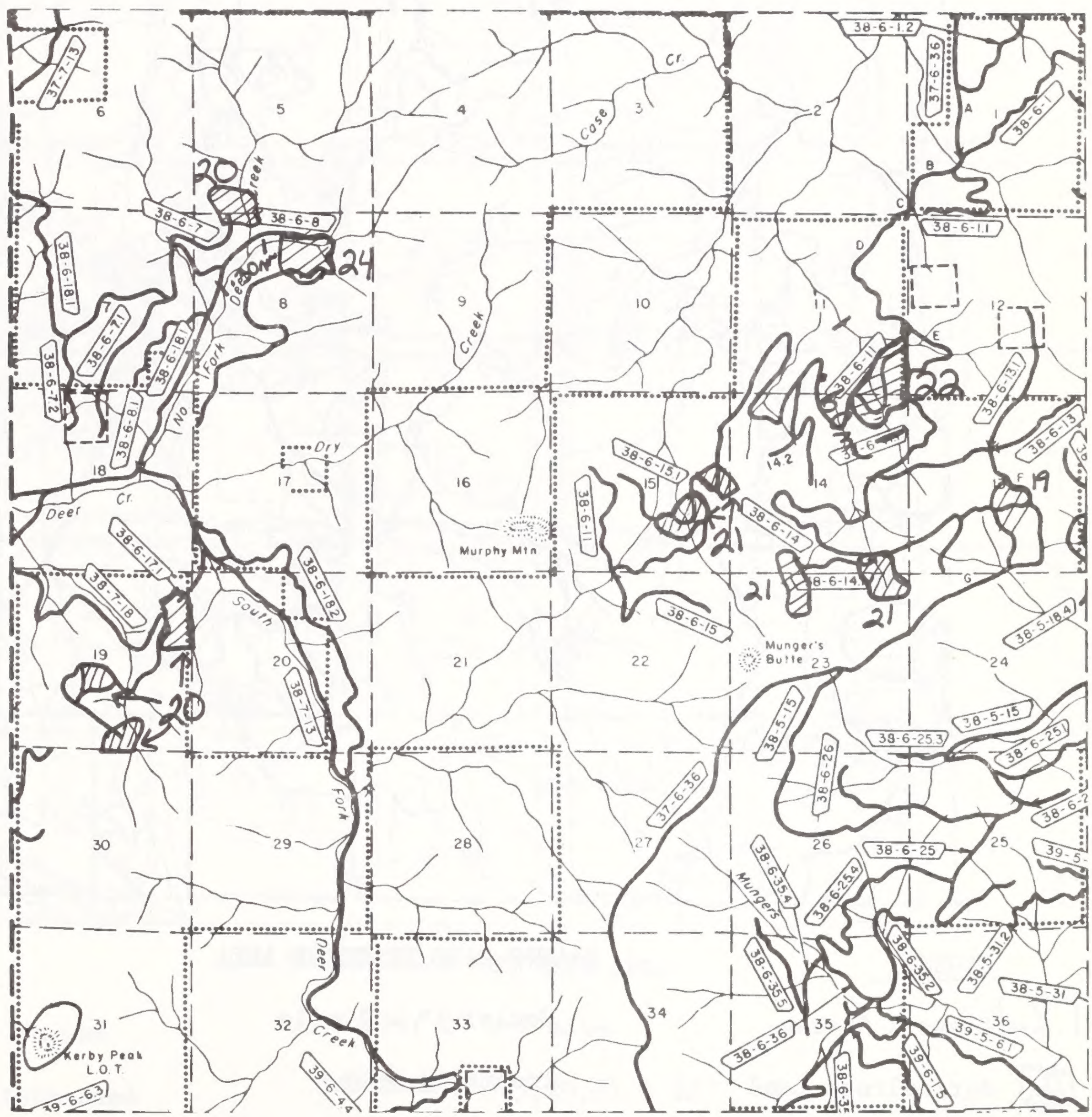
Scale: 1" = 1 mile

Treatments # 19,20,21,22&24

LEGEND

- Class I Stream
- AGriculture Lands
- Residences
- Domestic Water Intake
- Project Area

T.38 S., R.6 W.
KIRBY PEAK

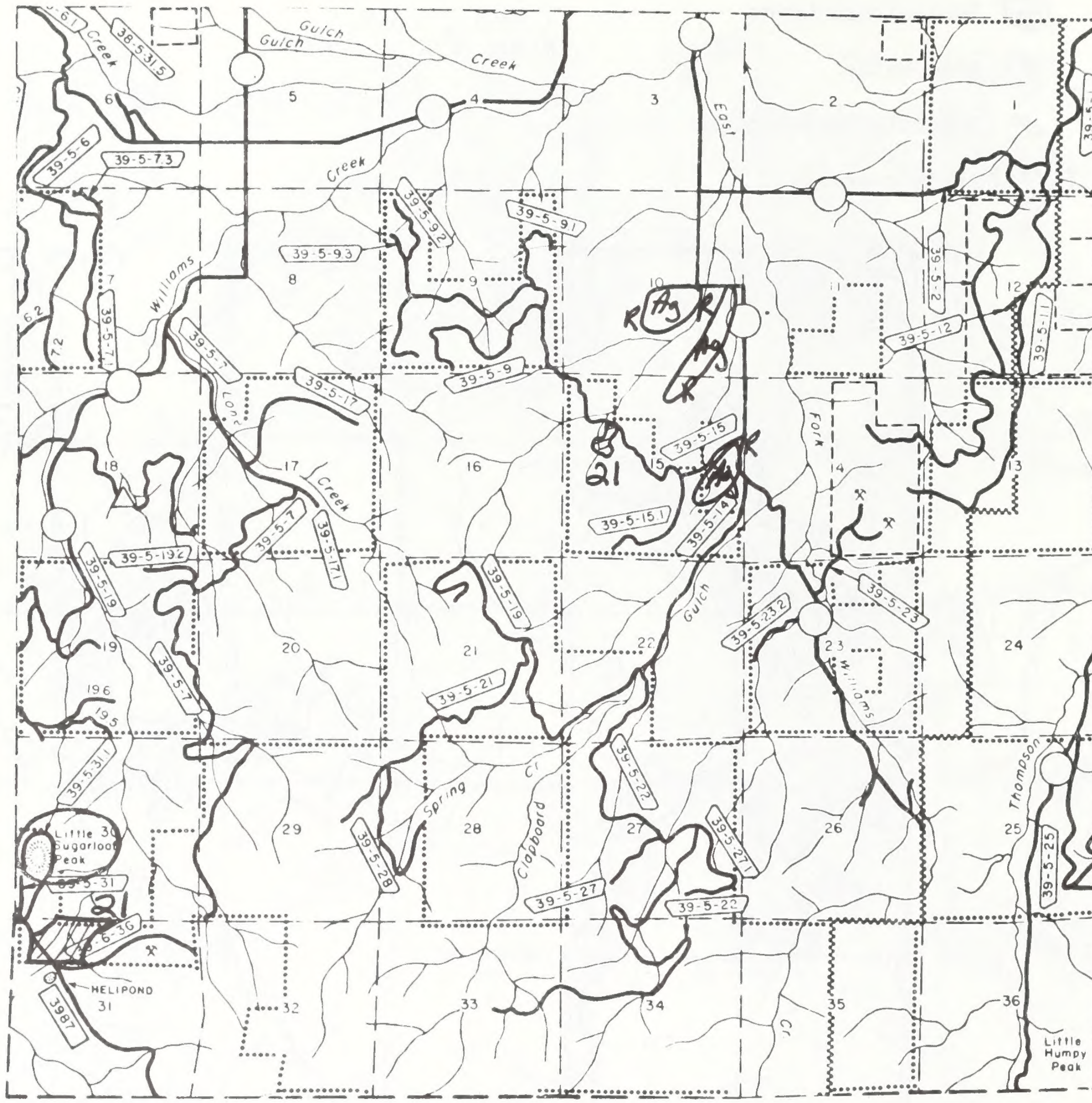


GRANTS PASS RESOURCE AREA

Scale: 1" = 1 mile

Treatments # 19,20,21,22 & 24

T.39 S., R.5 W.
LITTLE SUGARLOAF



LEGEND

1. Xm/ Class I Stream

Ag Agriculture Land

R Residences

Domestic Water Intake

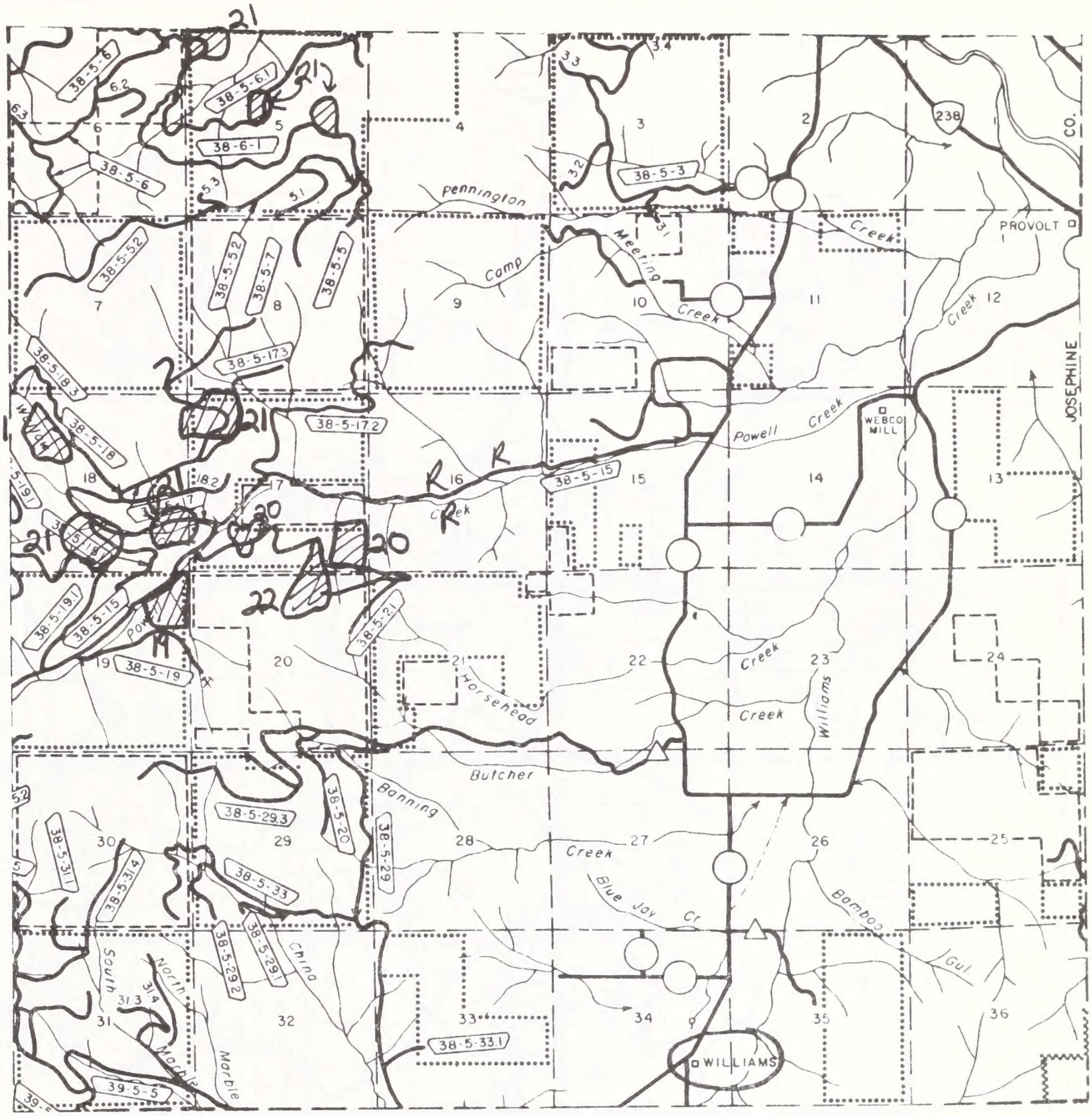
Project Area

GRANTS PASS RESOURCE AREA

Scale: 1" = 1 mile

Treatment # 21

T.38 S., R.5 W.
WILLIAMS



GRANTS PASS RESOURCE AREA

Scale: 1" = 1 mile

Treatments #19,20,21 & 22

LEGEND

| Xm | Class I Stream

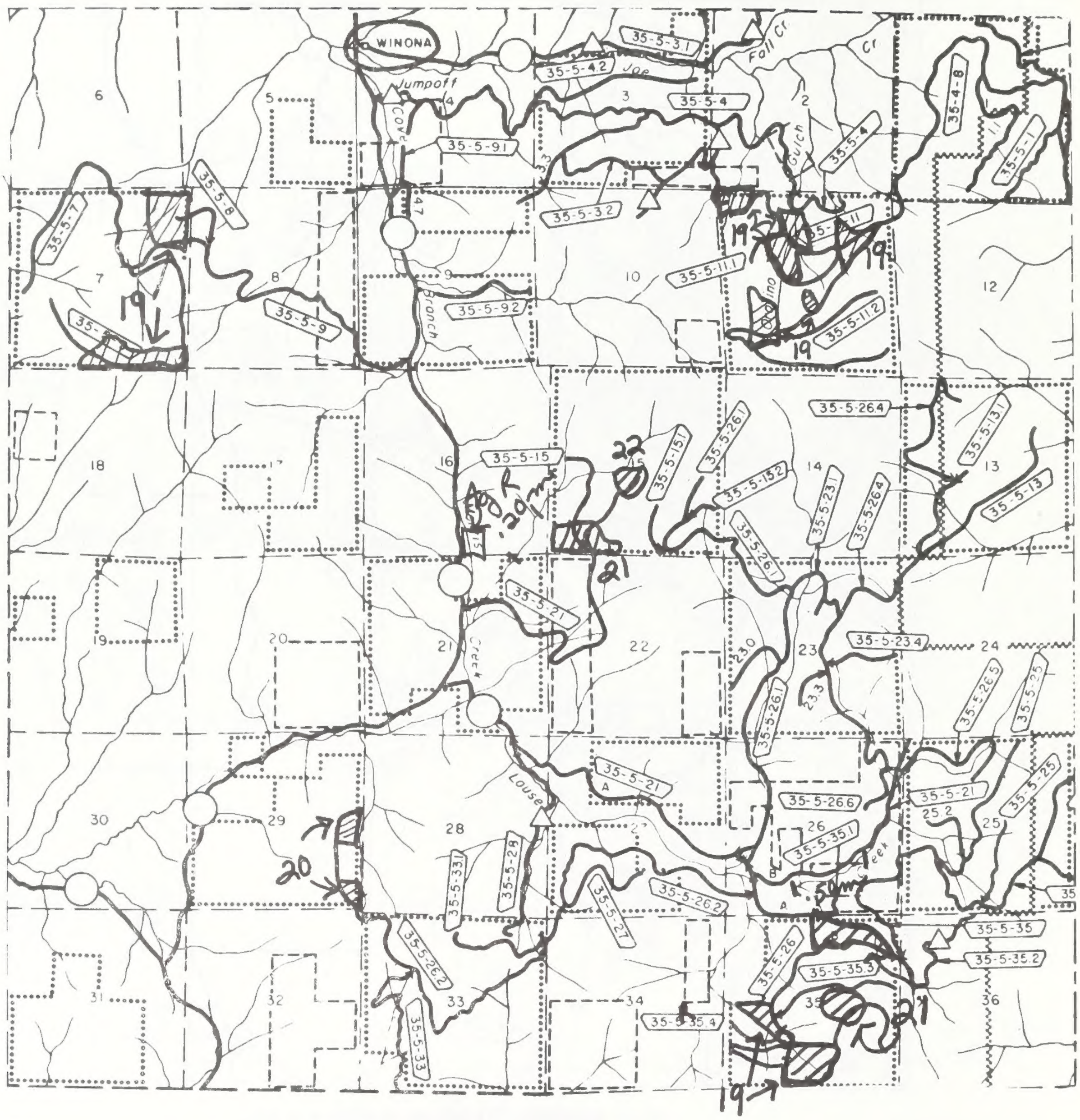
Ag Agriculture Land

R REsidences

Domestic Water Intake

Project Area

T.35 S., R.5 W.
WINONA



LEGEND

I.Xm	Class I Stream
Ag	Agriculture Land
R	Residences
	Domestic Water Intake
	Project Area

GRANTS PASS RESOURCE AREA

Scale: 1" = 1 mile

Treatments #19,20,21&22

LEGEND

1.Xm Class I Stream

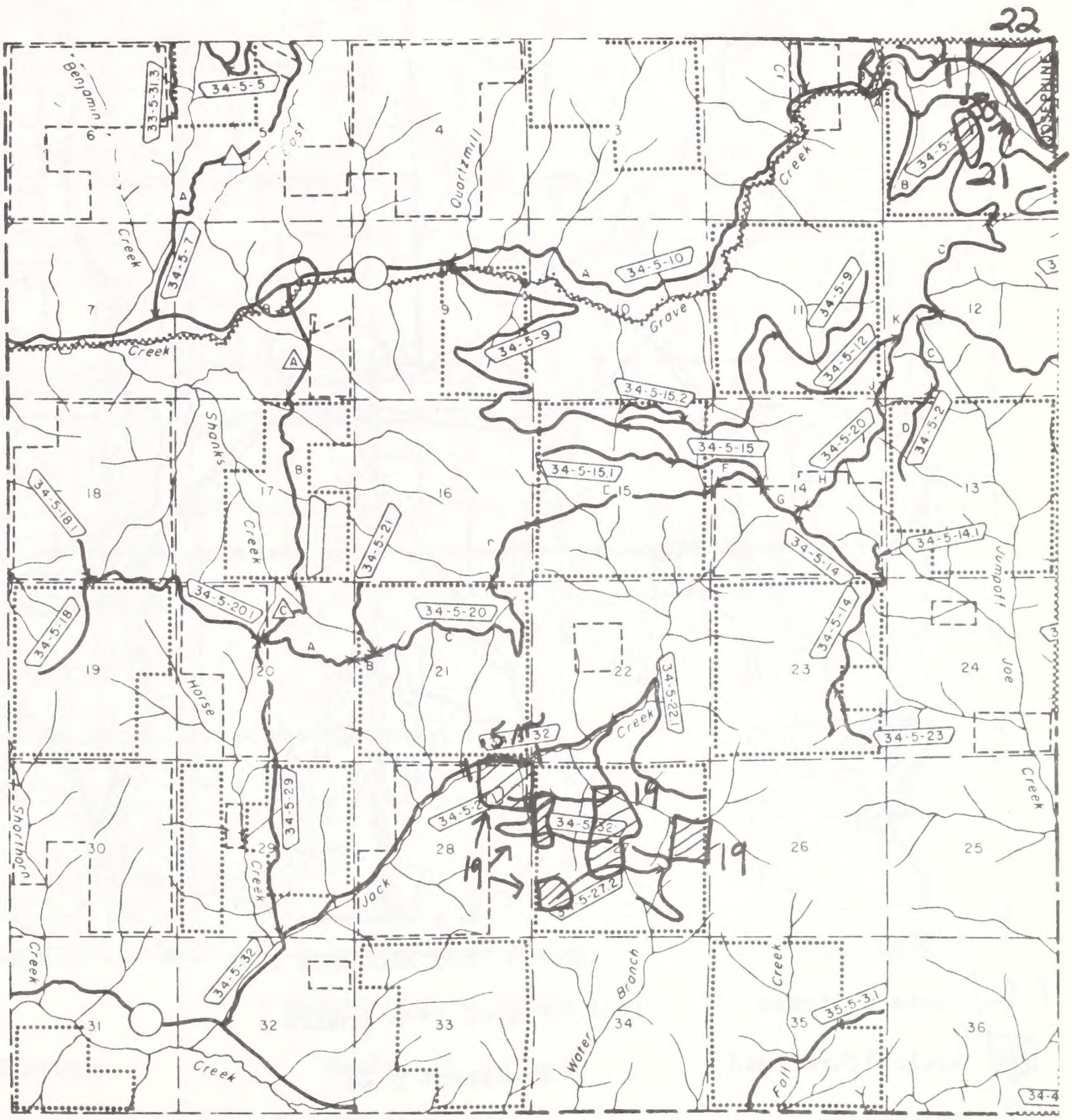
Ag Agriculture Land

R Residences

Domestic Water Intake

Project Area

T.34 S., R.5 W.
GRAVE CREEK, SHANKS CREEK ROAD JUNCTION

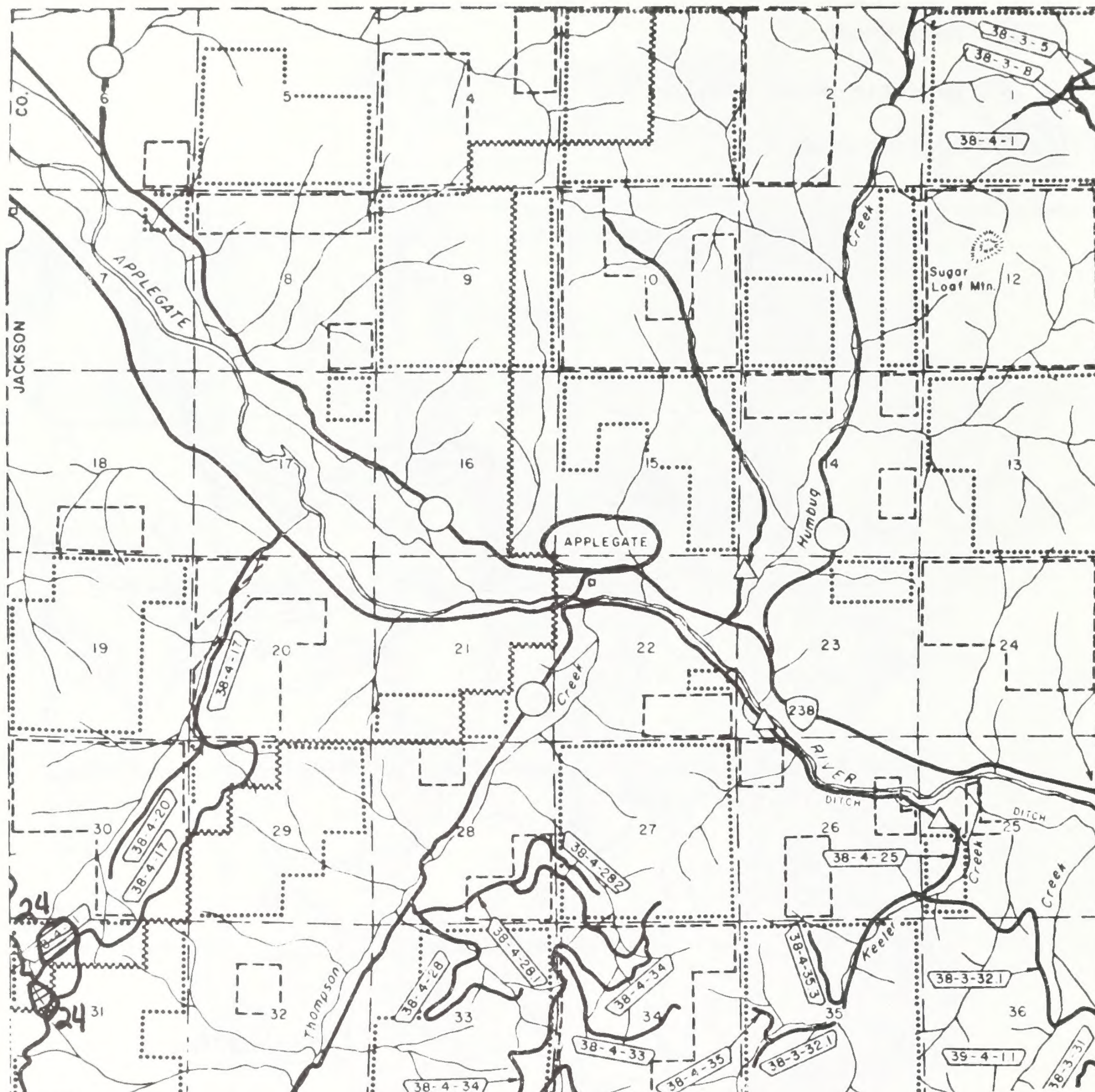


GRANTS PASS RESOURCE AREA

Scale: 1" = 1 mile

Treatments #19,21&22

T.38 S., R.4 W.
APPLEGATE



LEGEND

1. Xm Class I Stream

Ag Agriculture Land

R Residences

Domestic Water Intake

Project Area

GRANTS PASS RESOURCE AREA

Scale: 1" = 1 mile

Treatment # 24

T.34 S., R.4 W.
PLEASANT CREEK, DITCH CREEK ROAD JUNCTION

LEGEND

1. Xm Class I Stream

Ag Agriculture Land

R Residences

Domestic Water Intake

Project Area

GRANTS PASS RESOURCE AREA

Scale: 1" = 1 mile

Treatment #22

T.33 S., R.4 W.
QUARTZ MILL

LEGEND

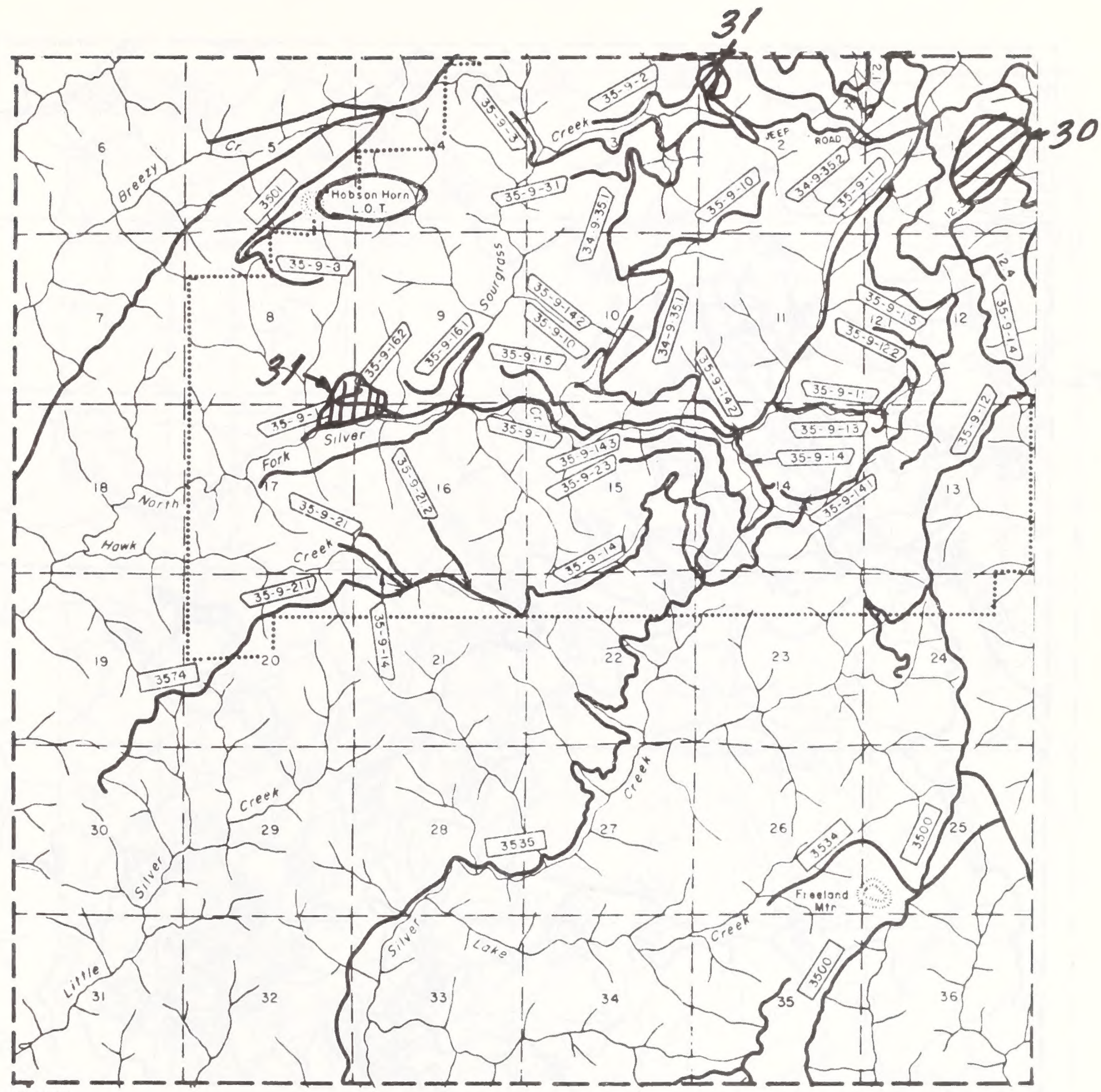
1. Xm	Class I Stream
Ag	Agriculture Land
R	Residences
	Domestic Water Intake
	Project Area

GRANTS PASS RESOURCE AREA

Scale: 1" = 1 mile

Treatments # 19,21 & 24

T.35 S., R.9 W.
HOBSON HORN



LEGEND

1.Xm Class I Stream

Ag Agriculture Land

R Residences

Domestic Water Intake

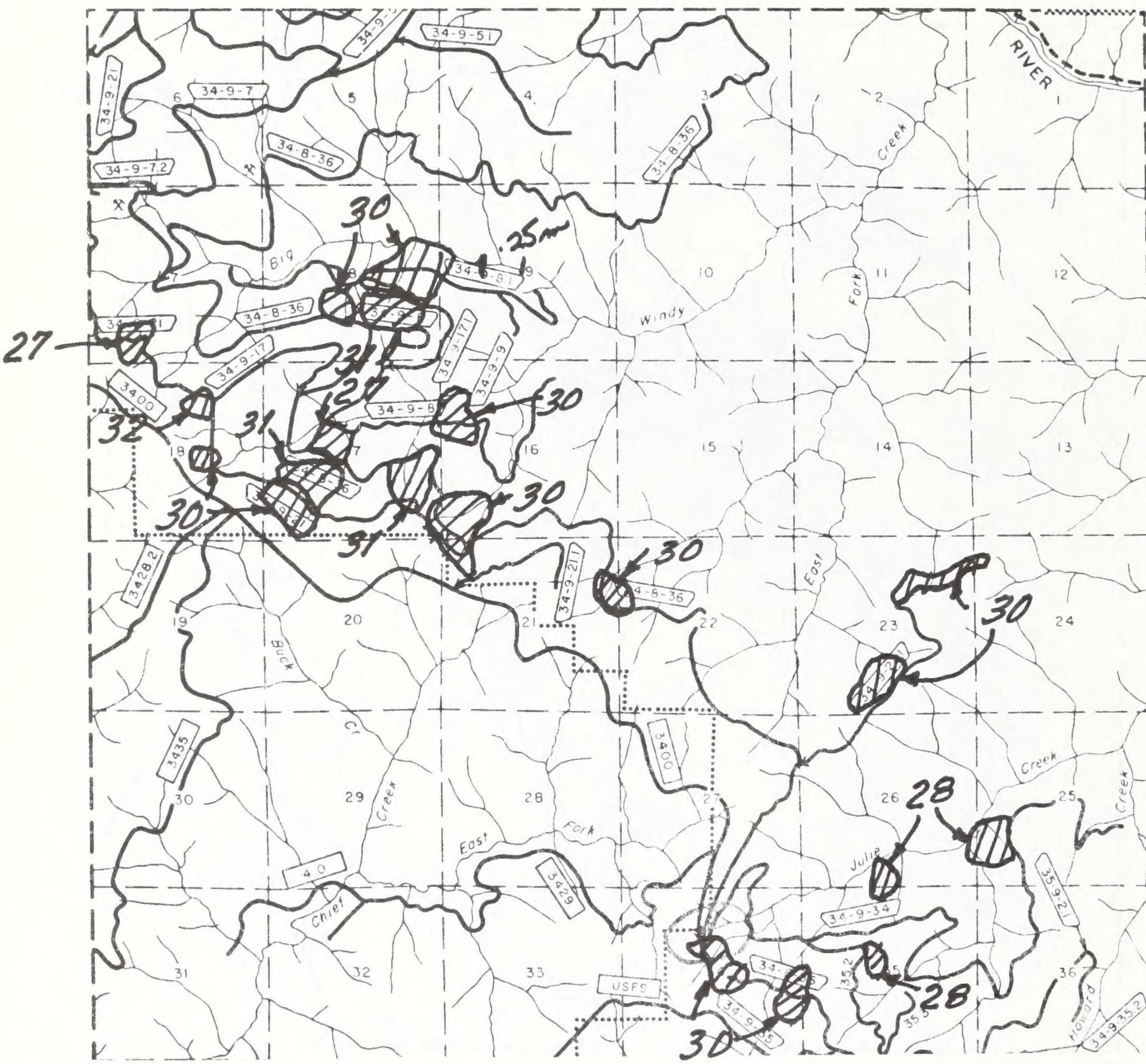
Project Area

Galice Resource Area

Scale: 1"=1 mile

Treatment No's 30&31

T.34 S., R.9 W.
GALICE ACCESS ROAD, F.S. BEAR CAMP ROAD JUNCTION



LEGEND

|.Xm| Class I Stream

Ag Agriculture Land

R Residences

Domestic Water Intake

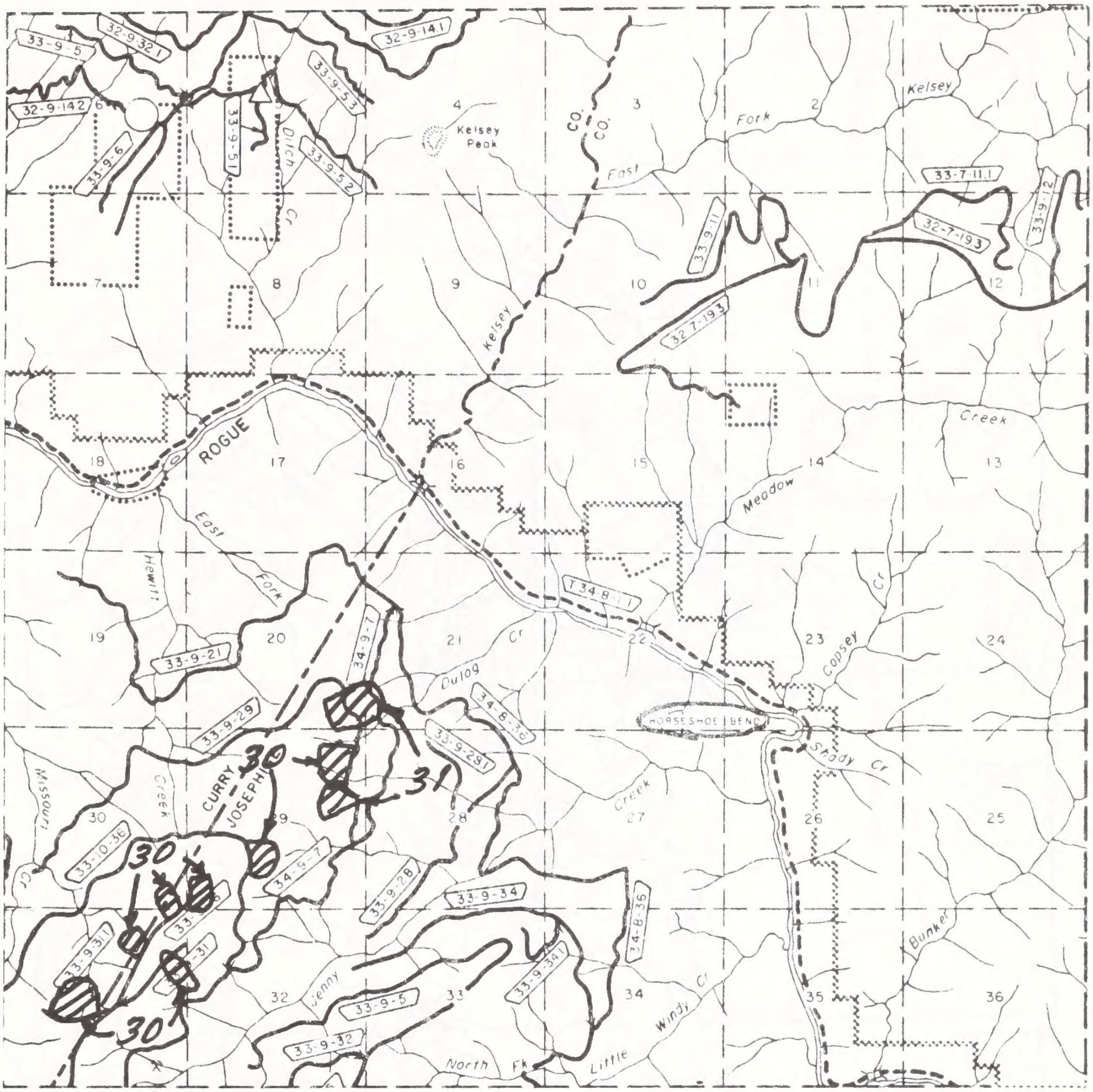
Project Area

Galice Resource Area

Scale: 1"=1 mile

Treatment No's 27,28,30,31&32

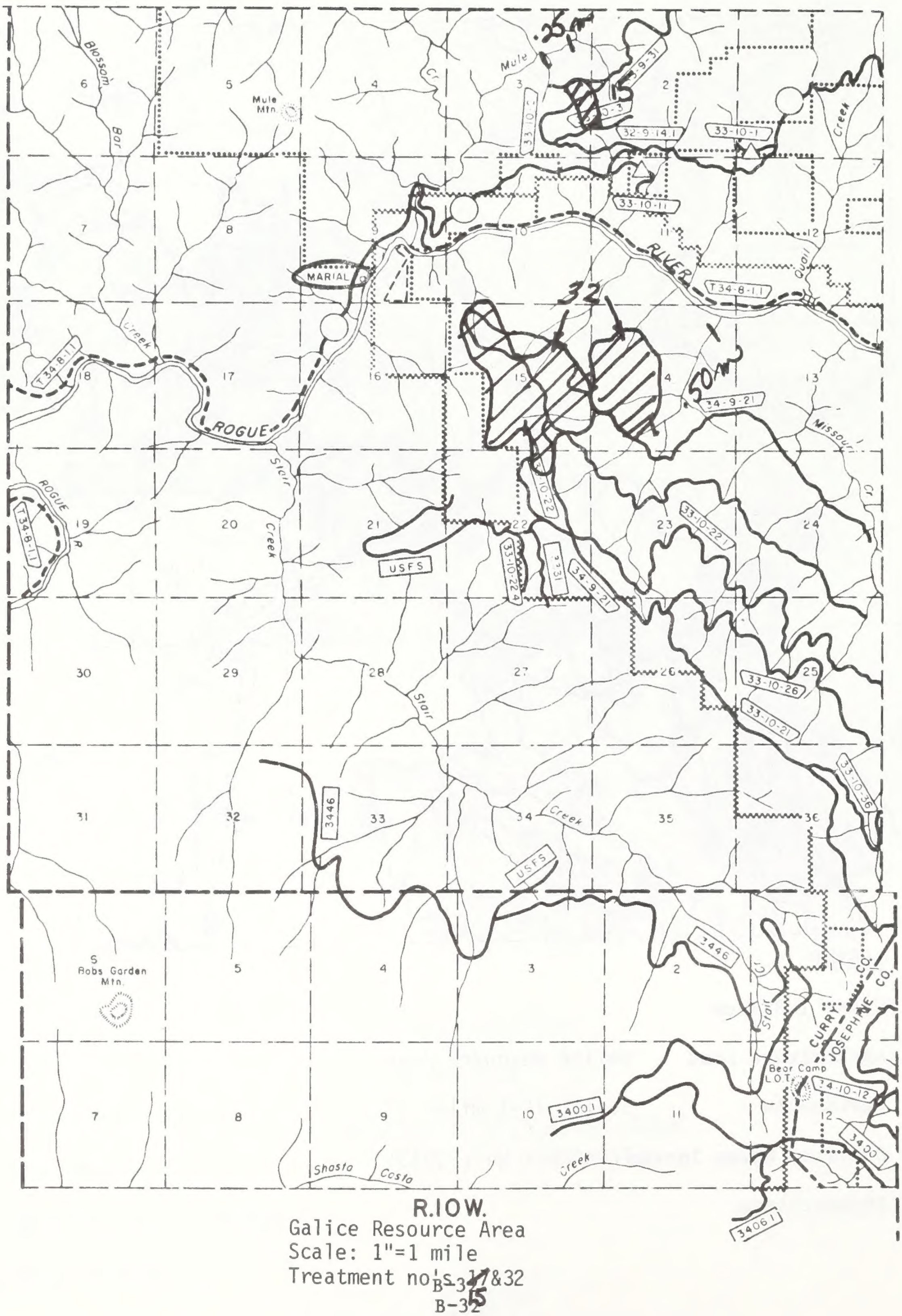
T.33 S., R.9 W.
HORSESHOE BEND



LEGEND

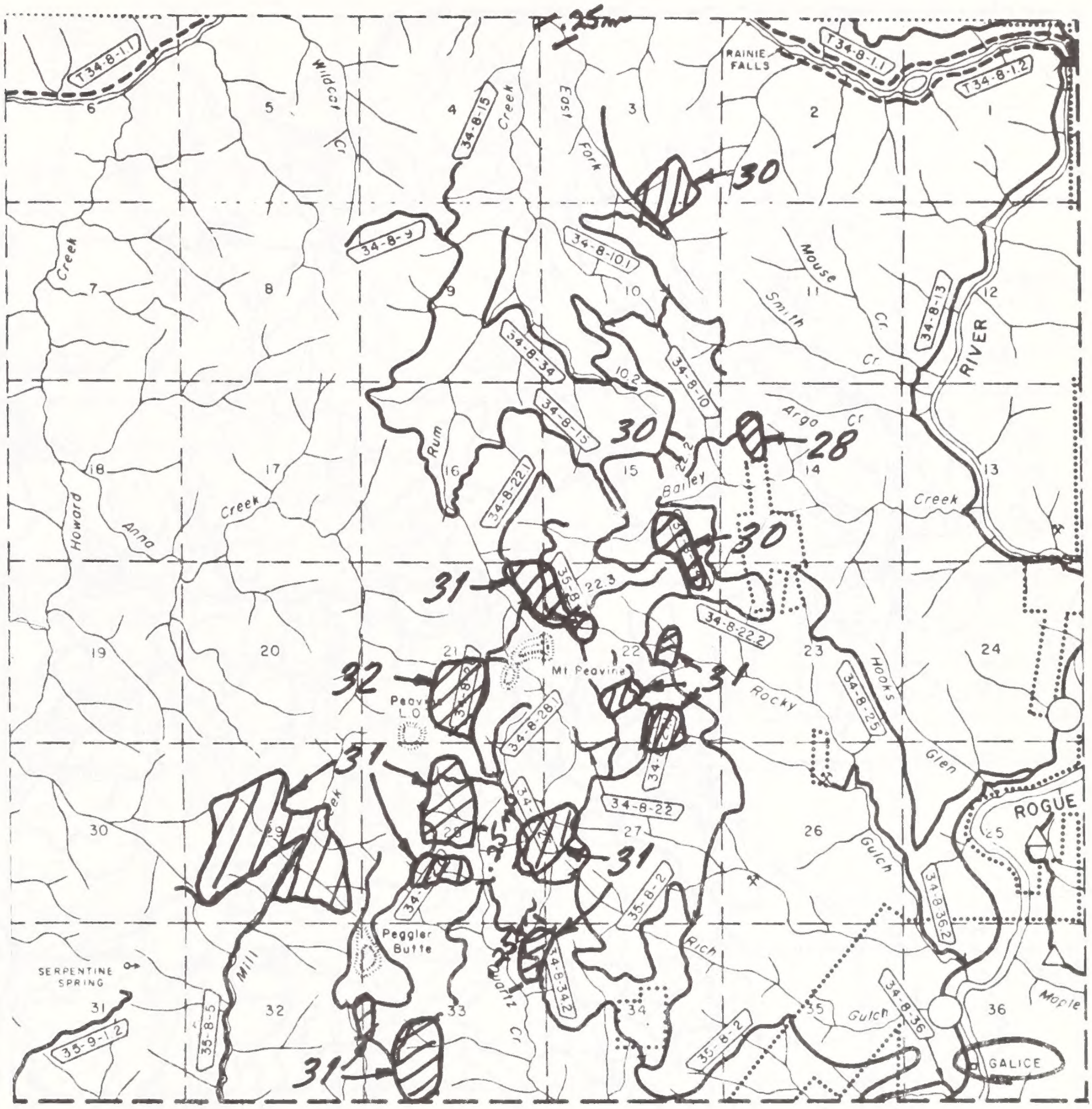
I.Xm	**Class I Stream**	
Ag	**Agriculture Land**	Galice Resource Area
R	**Residences**	Scale: 1"=1 mile
	Domestic Water Intake	Treatment No's 30&31
	Project Area	

T.33 S., R.10 W.
MARIAL



R.10W.
Galice Resource Area
Scale: 1"=1 mile
Treatment no's B-3 ~~17~~ 15 &32
B-32

T.34 S., R.8 W.
GALICE



LEGEND

Class I Stream

Agriculture Land

Residences

Domestic Water Intake

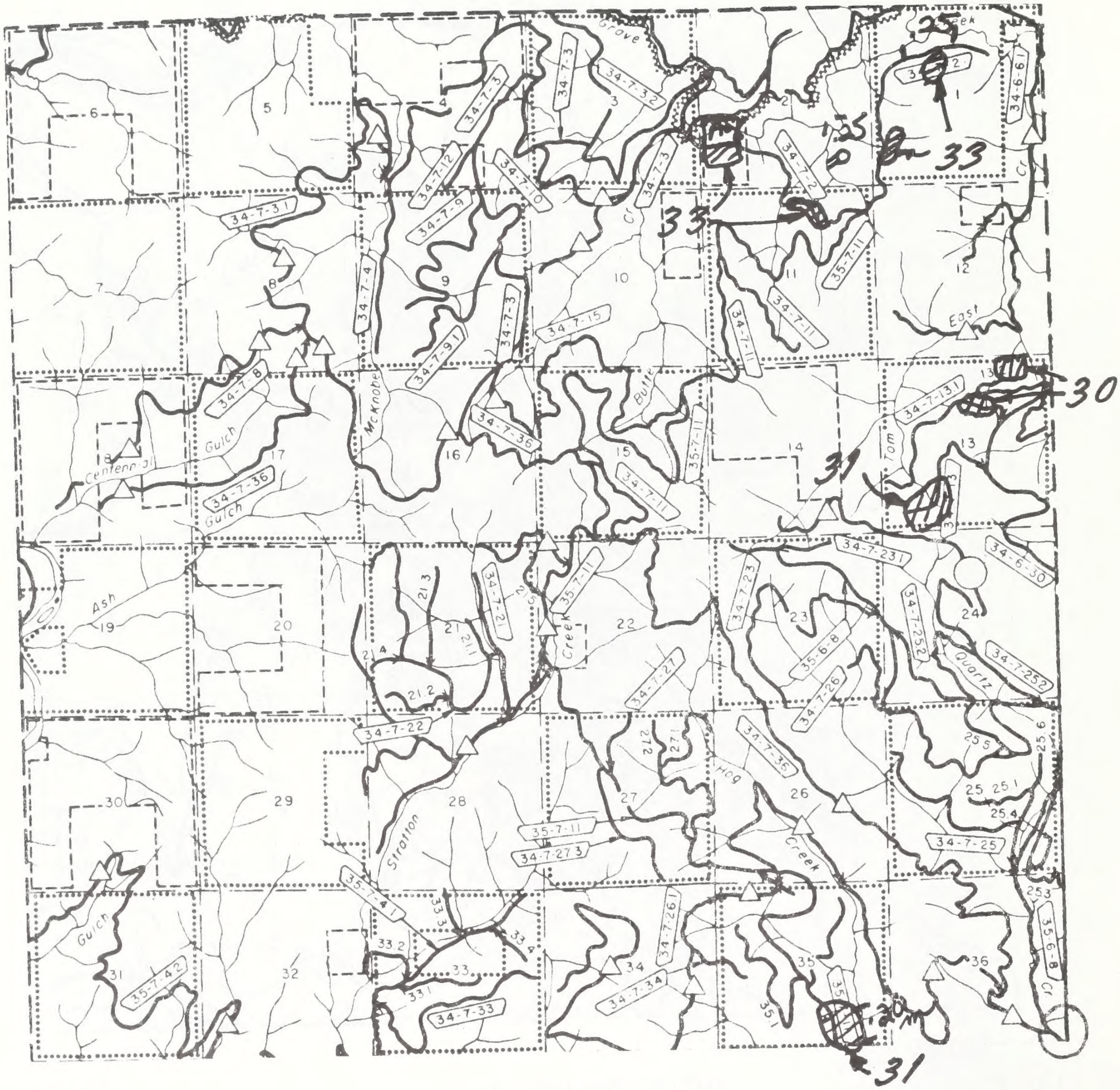
Project Area

Galice Resource Area

Scale: 1"=1 mile

Treatment No's 28,30,31&32

T.34 S., R.7 W.
QUARTZ CREEK ROAD



LEGEND

1.Xm Class I Stream

Ag Agriculture Land

R Residences

Domestic Water Intake

Project Area

Galice Resource Area

Scale: 1"=1 mile

Treatment No's 30,31&33

T.34 S., R.6 W.
SEXTON MTN.

LEGEND

Class I Stream

Agriculture Land

R Residences

Domestic Water Intake

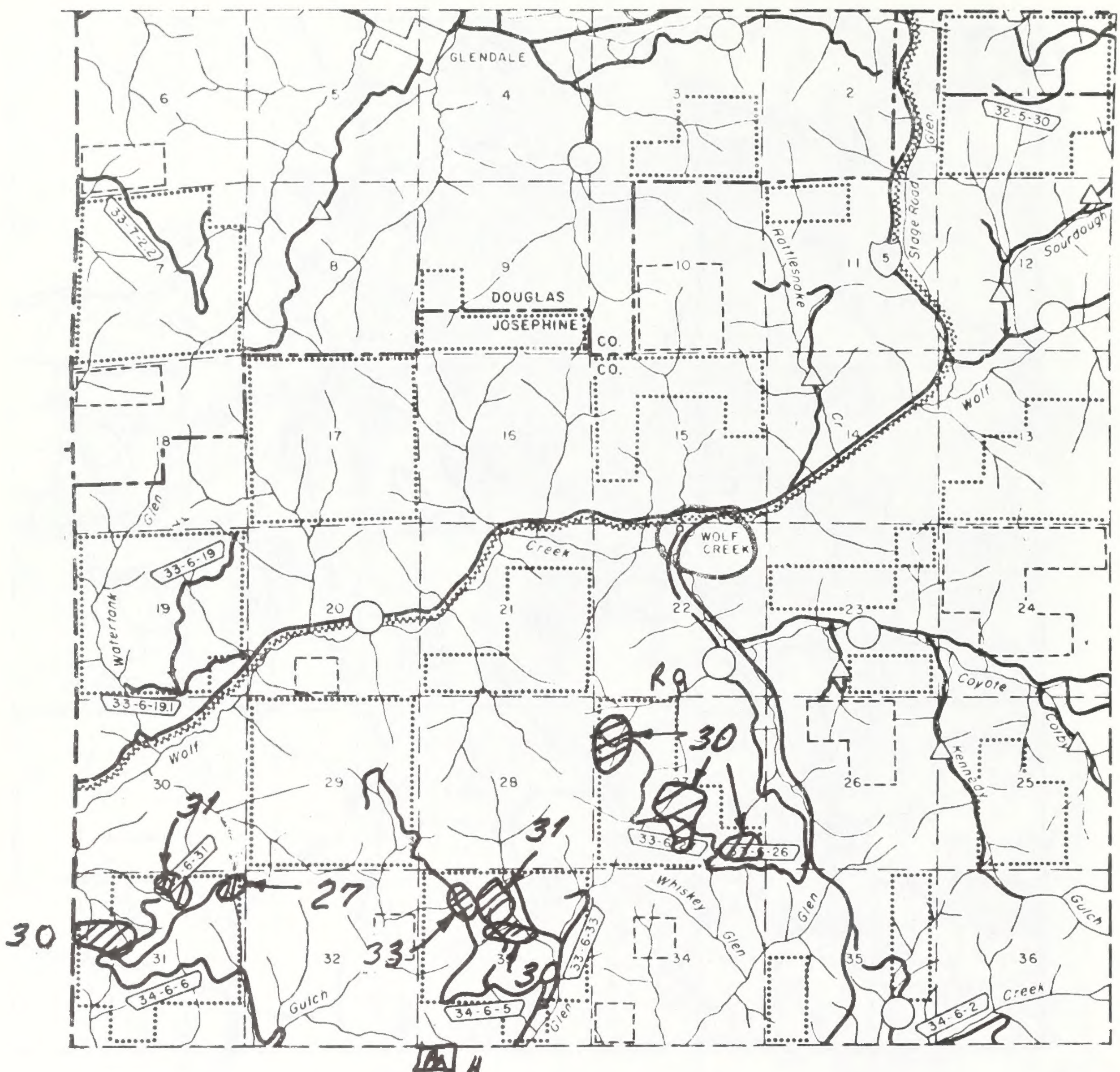
Project Area

Galice Resource Area

Scale: 1"=1 mile

Treatment No. 33

T.33 S., R.6 W.
WOLF CREEK



LEGEND

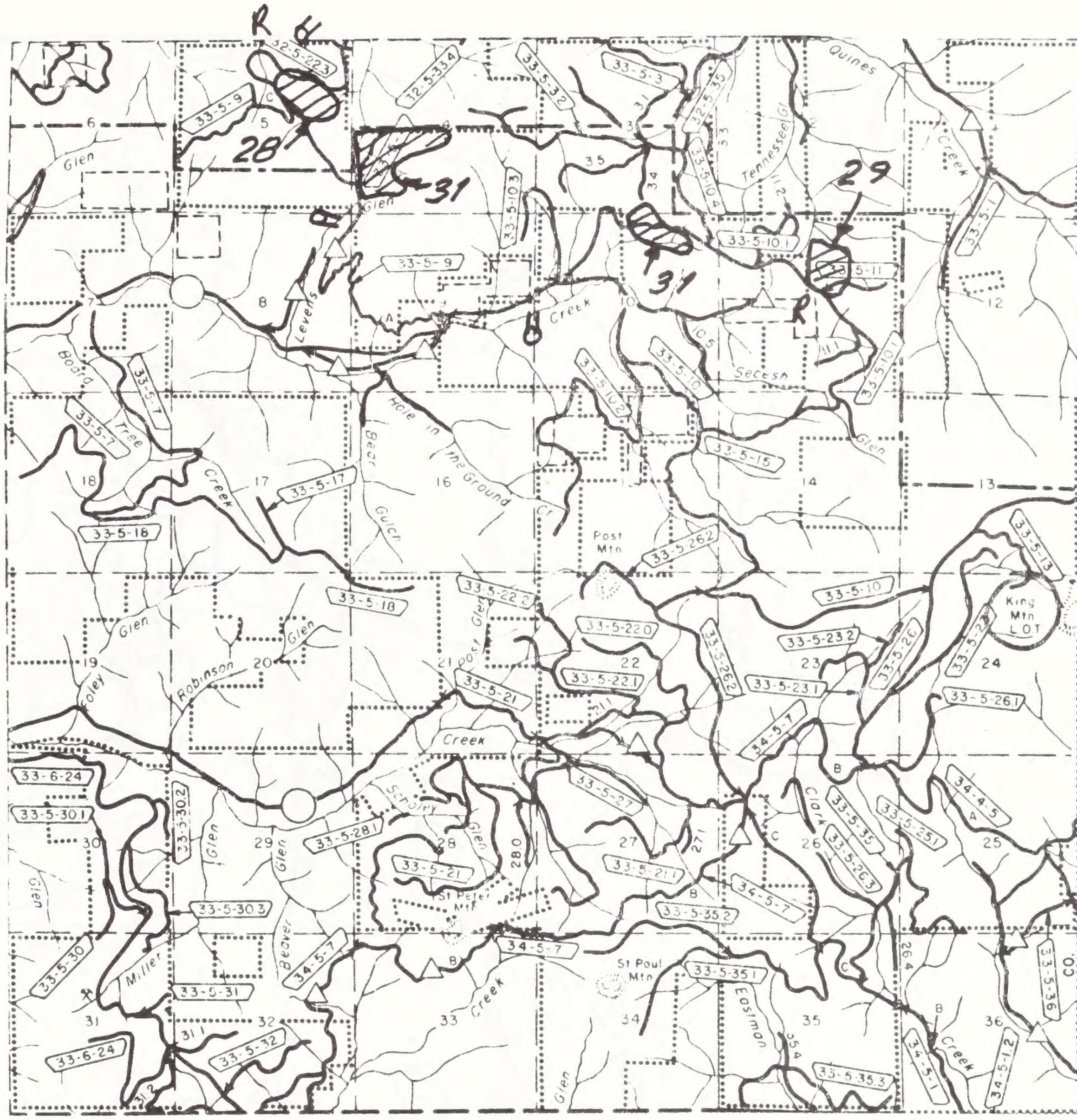
1.Xm	Class I Stream
Ag	Agriculture Land
R	Residences
	Domestic Water Intake
	Project Area

Galice Resource Area

Scale: 1"=1 mile

Treatment No's 27,30,31&33

T.33 S., R.5 W.
KING MTN.



LEGEND

|.Xm| Class I Stream

Ag Agriculture Land

R Residences

Domestic Water Intake

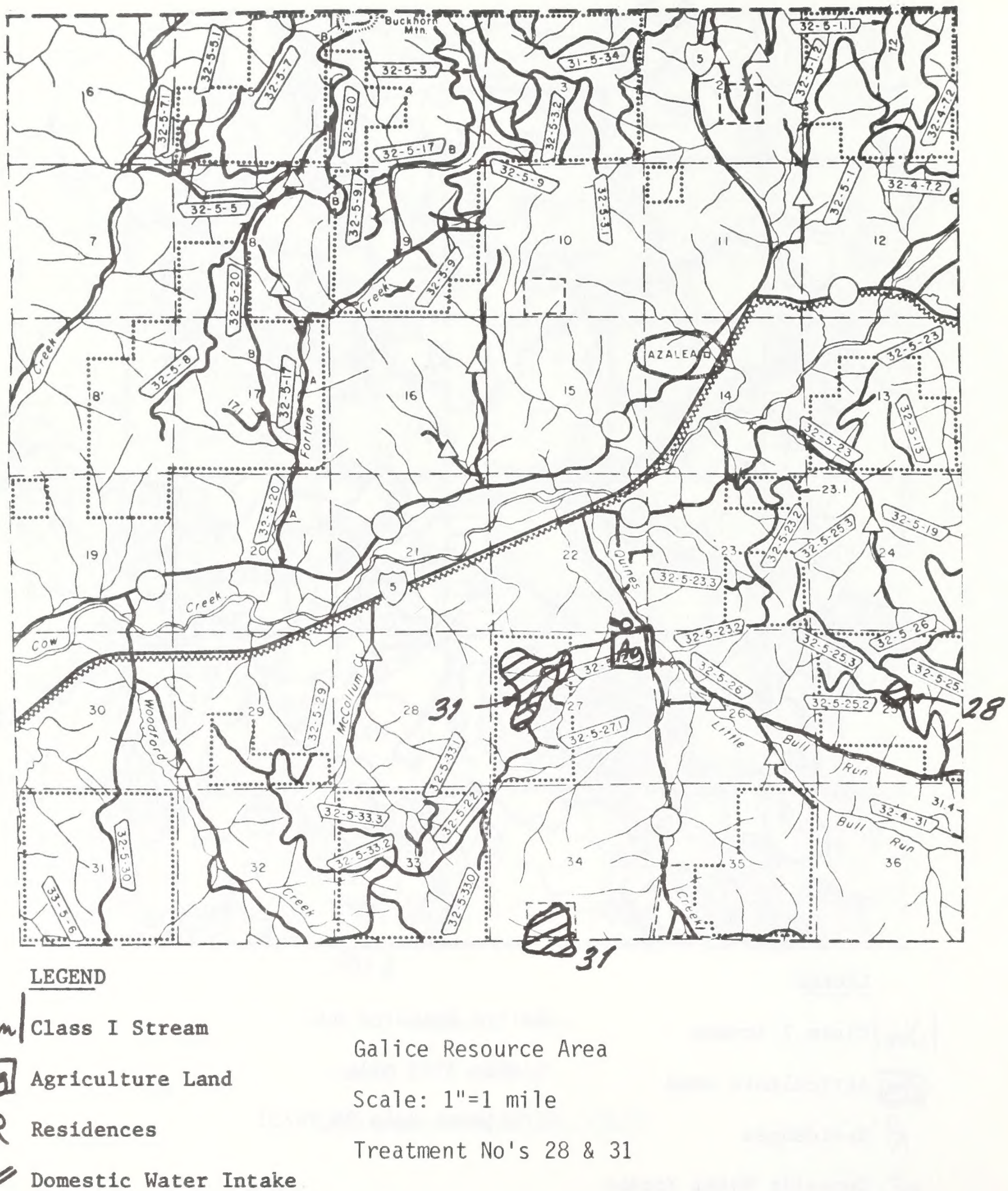
Project Area

Galice Resource Area

Scale: 1"=1 mile

Treatment No's 28,29&31

T.32 S., R.5 W.
AZALEA



LEGEND

Class I Stream

Agriculture Land

Residences

Domestic Water Intake

Project Area

Galice Resource Area

Scale: 1"=1 mile

Treatment No's 28 & 31

T.32 S., R.4 W.
GREEN MTN.

LEGEND

1.Xm Class I Stream

Ag Agriculture Land

R Residences

Domestic Water Intake

Project Area

Galice Resource Area

Scale: 1"=1mile

Treatment No. 31

APPENDIX C

ADDITIONAL AUTHORITIES

Materials Sales Act of 1947, as amended (30 U.S.C. 601 et.seq.)
Taylor Grazing Act of 1934, as amended (43 U.S.C. 315)
Federal Water Pollution Control Act (33 U.S.C. 1251-1376)
Clean Air Act (42 U.S.C. 1857)
Fish and Wildlife Coordination Act (16 U.S.C. 661-666c)
Bald and Golden Eagles Protection Act (16 U.S.C. 668-668d)
Federal Environmental Pesticide Control Act of 1972 (7 U.S.C. 136-136y)
Endangered Species Act of 1973 (16 U.S.C. 1531-1543)
National Historic Preservation Act of 1966 (16 U.S.C. 470-470b, 470c-470n)
Historic Sites Buildings and Antiquities Act (16 U.S.C. 461-467)
Safe Drinking Water Act (42 U.S.C. 300f-300; -9)
Noise Control Act of 1972 (42 U.S.C. 4901-4918)
Solid Waste Disposal Act (42 U.S.C. 3251-3259)
Antiquities Act (16 U.S.C. 431, 432, 433)
Executive Order 11593 (16 U.S.C. 470)
Wild and Scenic Rivers Act (16 U.S.C. 1271-1287)
Recreation and Public Purposes Act (43 U.S.C. 869, 869-4)

This list is illustrative and not necessarily comprehensive, although major laws are included.

APPENDIX D

Recommended Watershed Practices accepted by the Proposed Josephine MFP
(From: Watershed Recommendation 6.1, proposed Josephine MFP, Medford District)

Recommended Watershed Practices
For
BLM-Administered Lands in the Josephine Master Unit

Each of the following general units is delineated on the MFP Watershed Activity Recommendations Overlay. Recommended practices and the reasons for implementing the practices are given for all major management activities that influence water quality. The recommended practices are guidelines only and they should be used in conjunction with on-site investigations to determine the specific practice that will minimize water quality degradation and reduce losses in site productivity.

A. Alluvial Land General Unit (Shown as W-6 on MFP Step 1 Overlay)

Recommended Practice

1. Locate roads above the floodplain. Where it is necessary to construct roads within the floodplain, design the road to withstand inundation by rapidly flowing floodwaters. Place rock riprap on both the upstream and downstream sides of the road. Elevate the road above anticipated floodwaters using rock fill.

Reason

The major limitations associated with this unit are the frequency and duration of flood of the area adjacent to stream channels. Roads located in the flood plain are subject to inundation and deterioration by floodwater. Rock fill and riprap will give more roadbed stability.

B. (770) Pearsoll -(R) Rock Land General Unit (Shown as W-7 on MFP Step 1 Overlay)

Recommended Practice

1. Timber Harvest and Site Preparation on Shallow Clayey Serpentine Soils

Partial cut using a full suspension system. Plant to reestablish ground cover on bare soil areas. Shallow rocky areas should not be logged.

Limit yarding to dry season of the year (generally June through October).

Minimize downhill yarding.

2. Timber Harvest and Site Preparation on Deep Clayey Soils derived from Serpentine

Use alternatives to tractor logging whenever possible to minimize ground disturbance and compaction.

If tractors are used, require that blades not be allowed and that operation be limited to slopes less than 35 percent.

Tractor log only during the time of the year when the soil moisture content is lowest (generally July 15 through October 15).

Rip and waterbar all primary skid trails during driest time of year. Rip to a depth of 15 to 20 inches with spacing equal to depth alternative - rip primary skid trails only after final harvest.

Plant or seed skid roads prior to fall rains.

3. Timber Harvest in Boggy Areas

Allow no tractor logging in boggy areas or landscapes where water accumulates (i.e., swamps, drainage ways, etc.). Locate skid trails on ridges or other convex positions.

4. Timber Harvest on Slideprone Areas

Partial cut using a full suspension yarding system. Actively moving areas or slideprone areas traversed by roads should not be harvested.

5. Road Constructioon through Unstable Areas

Locate roads on stable positions such as ridges, natural benches, and gentle even slopes. Avoid seeps, old landslides, and slopes in excess of 70 percent.

6. Road Construction through Steep Areas

Avoid logging roads in steeply sloping areas dominated by rockland. Locate and design roads to minimize heights of cuts.

End haul materials, which would otherwise be sidecast during excvavation, to a safe disposal site (i.e., ridge crest, or natural bench).

7. Road Construction through Wet Areas

Locate roads on well drained soil types. Avoid wet areas by rolling the road grade.

Place perforated pipe or an open drainage ditch upslope from the cutbanks where crossing wet areas using large rocks as a base where cuts are not required. These practices should be employed only when alterntive routes are not available.

Construct roads during the period of year when the soil moisture content is lowest (generally late summer and early fall).

Reason

1. Disturbance of the surface of shallow clayey soil derived from serpentine would result in indadequate vegetation cover to minimize erosion. Vegetation is difficult to establish because of a magnesium toxicity which is impractical

to correct. Yarding during the dry season of the year will result in less compaction than yarding when soils are moist. Downhill yarding causes more surface disturbance than uphill yarding and therefore would create more erosion and sedimentation.

2. Tractor logging on clayey soils derived from serpentine will cause compaction, resulting in reduced infiltration and increased overland flow. Eroded clay particles from these soils will stay in suspension causing water quality degradation on and off site. Compaction will also reduce site productivity.

Adequate rehabilitation measures must be promptly undertaken if tractor logging is permitted to correct compaction problems and reestablish a protective vegetative cover to minimize erosion.

3. Tractor skid roads may interrupt surface and/or subsurface waterflow, resulting in an increase in landslide activity.

4. Clearcutting on or above debris slideprone slopes will substantially increase the probability of massive failure.

5. Road construction through unstable areas will greatly increase the probability of massive failure, i.e., slumps and earthflows.

6. Road construction through steeply sloping terrain dominated by rockland encourages rockfall and produces considerable sidecase. Sidecast material, being low in soil fines, is difficult to revegetate.

7. Roads constructed through wet areas often experience prism failures due to a poor bearing surface. Road failures have occured where facilities have not been provided to intercept surface and subsurface water.

C. 372-371 (R) Rock Land General Unit (W-8 on MFP Step 1 Overlay).

Recommended Practice

1. Timber Harvest Site Preparation and Removal of Brush or Hardwoods

Partial cut or avoid cutting on slopes exceeding 80 percent.

Use a suspension cable or aerial harvesting system.

Directional fall trees to the lead.

Limb all trees before yarding.

2. Timber Harvest and Site Preparation on Shallow Soils

Avoid tractor logging where shallow gravelly soils occur (i.e., on ridge crest and steep slopes).

3. Site Preparation on Shallow Soils

Use alternatives to burning (such as herbicides) in site preparation.

4. Road Construction Through Steep Areas

Confine roads to slopes less than 80 percent. Roll the road grade taking advantage of stable positions (i.e., ridges, saddles, and natural benches).

End haul excavated materials on slopes exceeding 70 percent, which would otherwise be sidecast during excavtion, to a safe disposal site (i.e., ridge crest, saddle, natural bench.)

5. Road Construction Through Dipped Bedding Planes

Locate roads through areas where the bedding pines or weathering surfaces are inclined with the slope. Existing road cuts in the area of proposed road location offer helpful clues to the orientation of the bedding planes.

6. Road Construction Through Fractured Bedrock

Avoid high, steeply sloping cuts in highly fractured bedrock. Locate and design roads to minimize heights of cuts.

Reasons

1. Excessive ground disturbances from using a ground lead harvesting system or clear cutting or removal of brush or hardwoods on very steeply sloping positions exposes the soil to raindrop splashy erosion and initiates soil raveling. The soil fines are removed and the available water capacity is reduced. Once these processes begin, it is difficult to reestablish the protective vegetative cover.

2. Tractor logging on ridge crests and steep slopes occupied by shallow gravelly soils will remove some surface soil and the duff layer, which protects the underlying soil from erosion by water and gravity. Removal of the duff layer and surface soil will reduce site productivity and degrade water quality.

3. Broadcast burning on shallow gravelly soils on steeply sloping terrain will remove the duff layer, thereby promoting excessive erosion and reducing site productivity. Reduction in site productivity is most significant on south and west exposures.

4. Road construction on slopes exceeding 80 percent results in considerable amounts of very gravelly material and rock fragments being sidecast. This buries downslope vegetation and creates a droughty condition, resulting in failure. Massive failures occur most frequently on the steepest headwalls.

5. Roads constructed through steeply sloping terrain where bedding planes or weathering surfaces are inclined with the slope are subject to massive failure (i.e., debris avalanches and rock slides).

6. Road cuts in fractured bedrock are most susceptible to rockfall. Rockfall fills ditches and plugs culverts which increases incidents of road failures.

D. (718) Deekman - (781) Colestine - (719) Manzanita General Unit (W-9 on MFP Step 1 Overlay).

Recommended Practice:

1. Timber Harvest, Site Preparation, and Removal-of-Brush or Hardwoods

Partial cut or avoid cutting on slopes exceeding 80 percent (especially critical on droughty south and west exposures).

Use a suspension cable or aerial system for harvesting timber wherever possible. Minimize down hill yarding.

Limb all trees before yarding.

2. Timber Harvest and Site Preparation on Shallow Soils

Avoid tractor logging where shallow gravelly soils occur (i.e., on ridge crest and steep slopes).

3. Site Preparation on Shallow Soils

Use alternative to burning (such as herbicides) in site preparation.

4. Timber Harvest or Site Preparation on Steeply Sloping Clayey Overburden

Use partial cut logging systems on slopes exceeding 70% where road cuts reveal deep (40 inches or more) loamy or clayey overburden.

5. Timber Harvest and Site Preparation on Clayey Soils

Confine tractor logging to slopes less than 35 percent.

Tractor log only during time of year when moisture content is lowest (approximately July 15 through October). Rip and waterbar all primary skid trails. Rip to depth of 15 to 20 inches with spacing equal to depth. Waterbars should be spaced 25 to 50 feet intervals based on natural slope. Ripping should be accomplished at driest time of year.

Alternative: Rip primary skid trails only after final harvest.

Require use of tractors without blades.

6. Road Construction Through Steep Areas

Confine roads to slopes less than 80 percent. Roll the road grade, taking advantage of stable positions (i.e., ridges, saddles, and natural benches).

End haul excavated materials on slopes exceeding 70 percent which would otherwise be sidecast during excavation, to a safe disposal site (i.e., ridge crest, saddle, natural bench).

7. Road Construction Through Dipped Bedding Planes

Locate roads through areas where the bedding planes or weathering surfaces are not inclined with the slope. Existing road cuts in the area of proposed road location offer helpful clues to the orientation of the bedding planes.

8. Road Construction Through Fractured Bedrock

Avoid high steeply sloping cuts in highly fractured bedrock. Locate and design roads to minimize heights of cuts.

9. Road Construction Through Wet Areas

Locate roads on well drained soil types. Avoid wet areas by rolling the road grade.

Place perforated pipe or an open drainage ditch upslope from the cutbanks where crossing wet areas. Ramp over wet areas using large rocks as a base where cuts are not required. These practices should be employed only when alternate routes are not available.

Reasons:

1. Excessive ground disturbance from using a ground lead harvesting system or clear cutting or removal of brush and hardwoods on slopes in excess of 80 percent will expose soil to raindrop splash erosion and initiate soil raveling.

The soil fines are removed and the available water capacity is reduced (especially critical on droughty south and west exposures). Once these processes begin, it is difficult to re-establish protective vegetative cover.

2. Tractor logging on ridge crests and steep slopes occupied by gravelly soils will remove some surface soil and the duff layer, which protects the underlying soil from erosion by water and raveling. Removing the duff layer and surface soil will reduce site productivity and degrade water quality.

3. Broadcast burning on gravelly soils on steeply sloping south and west exposures will remove the duff layer thereby promoting erosion and reducing site productivity.

4. Clearcutting on shallow gravelly soils on steeply sloping landscape underlain by deep clayey overburden will increase massive failures, especially where roads traverse the clear cut unit.

5. Tractor logging on clayey soils (Manzanita soils) when moist will result in soil compaction, causing a reduction in infiltration and initiation of overland flow on skid trails. Overland flow dislodges and transports soil paricles causing water quality degradation. Tractor logging on slopes

exceeding 35 percent causes excessive soil disturbance. Ripping skid trails during driest time of the year maximizes soil fracturing and insures an increase in infiltration. Waterbars divert surface water onto vegetated areas which retard overland flow and act as sediment barriers.

6. Road construction on slopes exceeding 80 percent produces very gravelly sidecast material that buries downslope vegetation and creates a droughty condition resulting in reduced site quality. Sidecast can overload fill slopes and cuase road failures.

7. Roads constructed through steeply sloping terrain where bedding planes or weathering surfaces are inclined with the slope will have incidents of massive failure.

8. High, steep road cuts in fractured bedrock are most susceptible to rockfall. Rockfall fills ditches and plugs culverts, which increases incidents of road failures.

9. Road constructed through wet areas often experience prism failures due to a poor bearing surface. Road failures have occurred where drainage facilities have not been provided to intercept surface and subsurface water.

E. (712) Jumpoff - (718) Beekman General Unit (W-10 on MFP Step 1 Overlay).

Recommended Practice:

1. Timber Harvest or Site Preparation on Unstable Areas

Use alternatives to clearcutting on unstable areas (i.e., on oversteepened slopes composed of deep clayey overburden, in concave positions where seeps are found, on hummocky topography, and along drainageways).

E. (712) - (718) (Continued) Minimize downhill yarding.

Employ harvesting methods that minimize surface disturbance.

2. Timber Harvest or Site Preparation on Clayey Soils

Use alternatives to tractor logging whenever possible to minimize ground disturbance and compaction.

If tractors are used, require that blades not be allowed and that operation be limited to slopes less than 35 percent.

Tractor log only during the time of the year when the soil moisture content is lowest (approximately July 15 through October 15).

Rip and waterbar all primary skid trails. Rip to a depth of 15 to 20 inches with spacing equal to depth: alternative - rip primary skid trails only after final harvest.

Plant or seed skid roads prior to fall rains.

3. Timber Harvesting Bug-Killed Timber

Evaluate bug-killed timber thoroughly before removing dead and dying trees to determine cause of insect infestation. Remove dead and dying timber by method that minimizes surface disturbance (i.e., suspension systems).

4. Timber Harvest in Boggy Areas

Allow no tractor logging in boggy areas.

5. Roads Construction on Unstable Areas

Locate roads on stable positions such as ridges, natural benches, and gentle even slopes. Avoid seeps, old landslides, and oversteepended slopes.

6. Sidecast Material from Road Construction

End haul material that would otherwise be sidecast during road construction, to a safe disposal site.

7. Road Construction Through Wet Areas

Locate roads on well drained soil types. Avoid wet areas by rolling the road grade. Place perforated pipe or an open drainage ditch upslope from the cut-banks where crossing wet areas. Ramp over wet areas using large rocks as a base where cuts are not required. These practices should be employed only when alternate routes are not available.

Construct roads during the period of the year when the soil moisture content is lowest (late summer and early fall).

Reasons:

1. Clearcutting and excessive surface disturbance in unstable areas will increase massive failure, especially where roads traverse the clear cut unit.

2. Tractor logging removes the duff layer and results in soil compaction, especially when soils are moist, causing a reduction in infiltration and initation of overland flow on skid trails and a subsequent reduction in site productivity. Overland flow dislodges and transports soil particles causing water quality degradation. Waterbarring and ripping skid trails during the driest time of the year maximizes solid fracturing thereby increasing infiltration. Alternative methods of timber harvest result in less soil exposed and less compaction. Studies show that tractor logging a clear cut exposes soil on 24 to 35 percent of the area versus approximately 10% exposed soil using a skyline system.

3. Harvesting bug-killed timber may result in an increase in mass failure incidents. Dead and dying timber is often on unstable positions created by a seasonal watertable that weakened the timber and encouraged insect infestation.

4. Tractor logging in boggy areas may alter or intercept subsurface water flow, causing a rise in the watertable and a subsequent reduction in site productivity. High watertables restrict rooting and weaken native vegetation.

5. Roads constructed on oversteepened slopes, hummocky (uneven) topography, and across seeps and old landslides will substantially increase the occurrence of massive failures.

6. Sidecast material from road construction, when saturated, causes road failures, buries downslope vegetation, and degrades water quality.

7. Roads constructed through wet areas often experience prism failure due to a poor bearing surface. Road failures have occurred where drainage facilities have not been provided to intercept surface and subsurface water. Road construction during the driest time of the year will insure that the watertable will be at its lowest point and the possibility of intercepting the watertable will be minimal.

Interception of subsurface flow results in surface flow and subsequent erosion.

F. 371-372-370 General Unit (W-11 on MFP Step 1 Overlay)

1. Timber Harvest, Site Preparation, and Removal of Brush or Hardwoods

Partial cut or avoid cutting on slopes exceeding 80 percent.

Use a suspension cable or aerial harvesting system whenever possible.

Directional fall trees to the lead.

Limb all trees before yarding.

2. Timber Harvest and Site Preparation on Shallow Soils

Avoid tractor logging where shallow gravelly soils occur (i.e., on ridge crests and steep slopes).

3. Site Preparation on Shallow Sites

Use alternatives to burning (such as herbicides) in site preparation.

4. Timber Harvest Site Preparation on Slideprone Areas

Parital cut using a full suspension yarding system, if possible. Avoid harvesting actively moving areas or slideprone areas traversed by roads.

5. Road Construction Through Steep Areas

Confine roads to slopes less than 80 percent. Roll the road grade taking advantage of stable positions (i.e., ridges, saddles and natural bridges).

6. Road Construction Through Dipped Bedding Planes

Locate roads through areas where the bedding planes or weathering surfaces are not inclined with the slope. Existing road cuts in the area of proposed road location offer helpful clues to the orientation of the bedding planes.

7. Road Construction Through Fractured Bedrock

Avoid steeply sloping cuts in highly fractured bedrock. Locate and design roads to minimize heights of cuts.

Reasons:

1. Excessive ground disturbance from using round lead harvesting system or clearcutting or removal of brush or hardwood on very steeply sloping positions exposes the soil, permits raindrop splash erosion, and initiates soil raveling. The soil fines are removed and the available water capacity is reduced. Once these processes begin, it is difficult to reestablish a protective vegetative cover.

2. Tractor logging on ridge crests and steep slopes occupied by shallow gravelly soils will remove the duff layer and surface soil which protects the underlying soil from erosion by water and gravity. Removing the duff layer, followed by reduction in soil fines, will reduce site productivity and degrade water quality.

3. Broadcast burning on shallow gravelly soils on steeply sloping terrain will remove the duff layer thereby promoting excessive erosion and reducing site productivity. Reduction in site productivity is most significant on south and west exposures.

4. Clearcutting, when combined with road construction on steep sideslopes underlain by deep loamy or clayey overburden, will increase massive failures.

5. Road construction on slopes exceeding 80 percent produces very gravelly sidecast material that buries downslope vegetation and creates a droughty condition resulting in reduced site quality. Sidecast can overload fill slopes and cause road failures. Massive failures occur most frequently on the steepest headwalls.

6. Roads constructed through steeply sloping terrain where bedding planes or weathering surfaces are inclined with the slope will have incidents of massive failure.

7. High, steeply sloping road cuts in fractured bedrock are most susceptible to rockfall. Rockfall fills ditches and plugs culverts, which increases incidents of road failures.

Recommended Practice:

1. Timber Harvest and Site Preparation on Unstable Areas

Use alternatives to clearcutting on unstable areas (i.e., on oversteepened slopes composed of deep clayey overburden, in concave positions where seeps are found, on hummocky topography, and along drainageways).

Minimize downhill yarding.

2. Timber Harvest and Site Preparation on Clayey Soils

Use alternatives to tractor logging whenever possible to minimize ground disturbance and compaction.

If tractors are used, require that blades are not allowed and that operation be limited to slopes less than 35 percent.

Tractor log only during the time of year when the soil moisture content is lowest (approximately July 15 through October 15).

Rip and waterbar all primary skid trails. Rip to a depth of 15 to 20 inches with spacing equal to depth; alternatives - rip primary skid trails only after final harvest.

Plant or seed skid roads prior to fall rains.

3. Timber Harvesting Bug-Killed Timber

Evaluate bug-killed timber thoroughly before removing dead and dying trees to determine cause of insect infestations. Remove dead and dying timber by methods that minimize surface disturbance (i.e., suspension systems).

4. Timber harvest in Boggy Areas

Allow no tractor logging in boggy areas.

5. Road Construction on Unstable Areas

Locate roads on stable positions such as ridges, natural benches, and gentle, even slopes. Avoid seeps, old landslides, and over steepened slopes.

6. Sidecast Material from Road Construction

End haul material, that would otherwise be sidecast during road construction, to a safe disposal site.

7. Road Construction Through Wet Areas

Locate roads on well drained soil types - avoid wet areas by rolling the road grade. Place a perforated pipe or an open drainage ditch upslope from the cutbanks where crossing wet areas. Ramp over wet areas using large rocks as a base where cuts are not required. These practices should be employed only when alternative routes are not available.

Construct roads during the period of the year when the soil moisture content is lowest (generally summer and early fall).

Reasons:

1. Clearcutting in unstable areas will increase massive failure, especially where roads traverse the clearcut unit.

Uphill yarding results in less surface disturbance than downhill yarding.

2. Tractor logging removes the duff layer and results in soil compaction, especially when soils are moist, causing a reduction in infiltration and initation of overland flow on skid trails and a subsequent reduction in site productivity. Overland flow dislodges and transports soil particles causing water quality degradation. Waterbarring and ripping skid trails during the driest time of the year maximizes solid fracturing thereby increasing infiltration. Alternative methods of timber harvest result in less soil exposed and less compaction. Studies show that tractor logging a clear cut exposes soil on 24 to 35 percent of the area versus approximately 10 percent exposed soil using a skyline system.

3. Harvesting bug-killed timber may result in an increase in mass failure incidents. Dead and dying timber is often on unstable positions created by a seasonal watertable that weakened the timber and encouraged insect infestation.

4. Tractor logging in boggy areas may alter or intercept subsurface waterflow, causing a rise in the watertable and a subsequent reduction in site productivity. High watertables restrict rooting and weaken native vegetation.

5. Roads constructed on oversteepened slopes, hummocky (uneven) topography, and across seeps and old landslides will substantially increase the occurrence of massive failures.

6. Sidecast material from road construction when saturated, causing roadfill failures, buries downslope vegetation and degrades water quality.

7. Roads constructed through wet areas often experience prism failures due to a poor bearing surface. Road failures have occurred where drainage facilities have not been provided to intercept surface and subsurface water. Road construction during the driest time of year will insure that the watertable will be at its lowest point and the possibility of intercepting the watertable will be minimal. Interception of subsurface flow results in surface flow and subsequent erosion.

Recommended Practice:

1. Timber Harvest or Site Preparation on Clayey Soils

Require that blades not be allowed and that operation be limited to slopes less than 35 percent if tractor logged.

Tractor log only during the time of the year when the soil moisture content is lowest (approximately July 15 through October 15).

Rip and waterbar all primary skid trails during driest time of year. Rip to a depth of 15 to 20 inches with spacing equal to depth. Alternative - rip primary skid trails only after final harvest.

Plant or seed skid roads prior to fall rains.

2. Timber Harvesting Bug-Killed Timber

Evaluate bug-killed timber thoroughly before removing dead and dying trees to determine cause of insect infestations. Remove dead and dying timber by methods that minimize surface disturbance (i.e., suspension systems).

3. Timber Harvest in Boggy Areas

Allow no tractor logging in boggy areas.

4. Road Construction on Unstable Areas

Locate roads on stable positions such as ridges, natural benches, and gentle, even slopes. Avoid seeps, old landslides, and oversteepened slopes.

5. Sidecast Material from Road Construction

End haul material, that would otherwise be sidecast during road construction, to a safe disposal site.

6. Road Construction Through Wet Areas

Locate roads on well drained soil types. Avoid wet areas by rolling the road grade. Place perforated pipe or an open drainage ditch upslope from the cutbanks where crossing wet areas. Ramp over wet areas using large rocks as a base where cuts are not required.

These practices should be employed only when alternate routes are not available.

Reasons:

1. Tractor logging removes the duff layer and results in soil compaction, especially when soils are moist, causing a reduction and initation of overland flow on skid trails and a subsequent reduction in site productivity. Overland flow dislodges and transports soil particles causing water quality degradation. Waterbarring and ripping skid trails during the driest time of the year maximizes solid fracturing thereby increasing infiltration. Alternate methods of timber harvest result in less soil exposed and less compaction. Studies show that tractor logging a clear cut exposes soil on 24 to 35 percent of the area versus approximately 10 percent exposed soil using a skyline system.

2. Harvesting bug-killed timber may result in an increase in mass failure incidents. Dead and dying timber is often on unstable positions created by a seasonal watertable that weakened the timber and encouraged insect infestation.

3. Tractor logging in boggy areas may alter or intercept subsurface waterflow, causing a rise in the watertable and a subsequent reduction in site productivity. High watertables restrict rooting and weaken native vegetation.

4. Roads constructed on oversteepened slopes, hummocky (uneven) topography, and across seeps and old landslides will substantially increase the occurrence of massive failures.

5. Sidecast material from road construction, when saturated, causes roadfill failures.

6. Roads constructed through wet areas often experience prism failure due to a poor bearing surface. Road failures have occurred where drainage facilities have not been provided to intercept surface and subsurface water.

I. (721) Siskiyou - (722) Holland General Unit (W-14 on MFP Step 1 Overlay)

Recommended Practice:

1. Timber Harvest and Site Preparation on or Above Slide-Prone Areas

Partial cut using a full suspension yarding system. Actively moving areas traversed by roads should not be harvested.

2. Timber Harvest and Site Preparation Slopes Exceeding 20 Percent

Limit tractor logging to slopes less than 20 percent. Remove blades from tractors during logging operations.

Waterbar and revegetate skid roads immediately following logging.

3. Timber Harvesting Bug-Killed Timber

Evaluate bug-killed timber thoroughly before removing dead and dying trees to determine cause of insect infestation. Remove dead and dying timber by methods that minimize surface disturbance (i.e., suspension systems).

4. Site Preparation on Sandy Granitic Soils

Use herbicides or other means as alternatives to burning or scarification.

5. Road Construction on Steep Slopes

Avoid locating roads on slopes exceeding 70 percent and on areas exhibiting instability. Roll the road grade, taking advantage of natural benches, ridges, and other stable positions.

6. Roadfills Crossing Drainages

Fills must be designed for stability when saturated and for overtopping. Rock fills are simple and effective. Bridging across debris channels is a viable alternative.

7. Compact Roadfills

Compact all fills to a degree consistent with design standards and material properties.

8. Road Construction Requiring Large Cuts and Fills

Construct cut slopes as steep as possible consistent with subsurface strength conditions. Multiple cut slopes should be constructed when weak, overburden requires it, and it is practical (i.e., natural ground slope makes it feasible). Buttress cut slopes with stability problems.

Roadface fill in excess of 15 feet on downstream slope exposure.

9. Road Design

Outslope all roads except where road grades exceed 8 percent and where crossing drainages.

10. Off-Road Vehicle (ORV) Use

ORV's (4-wheel drives and motorbikes) should be limited to surfaced roads. Discourage travel on skid roads, unsurfaced haul roads, and unroaded areas.

11. Granite Pits

Shape, mulch, seed, and fertilize granite material sites prior to abandonment. Refertilize at 3 to 5 year intervals.

Droughty conditions may require watering to maintain vegetation.

Construct and maintain sediment tramps on all streams within the watershed influenced by granite pits.

Reasons:

1. Clearcutting on or above debris slide prone areas will substantially increase the probability of massive failure.

2. Tractor logging on slopes over 20 percent results in surface soil displacement and destruction of protective vegetation. Bare, compacted, and disturbed soils are subject to erosion and subsequent water quality degradation.

3. Harvesting bug-killed timber may increase the mass failure hazard. Dead and dying timber is often on unstable positions created by a watertable that weakened the timber and encouraged insect infestation.

4. Broadcast burning on harvested areas will remove the duff layer, thereby promoting excessive erosion and reducing site productivity.

5. Road construction on slopes exceeding 70 percent which requires deep fills and/or high cuts, and on those areas showing evidence of instability, will result in substantial increases of massive failure.

6. All fills crossing drainages within this general soil unit must be viewed as acting as debris dams during their life. Slides occurring in drainageways will plug culverts resulting in road failures.

7. Granitic soils are subject to piping in uncompacted fills.

8. Large cuts and fills ravel and produce considerable sidecast, which buries downslope vegetation and creates a droughty condition, resulting in reduced site quality.

9. Inslope roads concentrate water in areas where water is not normally concentrated or in areas where the concentration exceeds the normally experienced during periods of peak discharge. Granitic soils, being low in clay, lack internal stability and are easily eroded when subjected to water concentrations.

10. ORV use increases overland flow by removing the protective duff layer and compacting of the soil, thereby increasing erosion. Granite soils lack sufficient cohesion due to small amounts of clay and silt; therefore, individual particles are easily detached and transported by water.

11. Granite bedrock, when exposed to weathering by water and temperature changes, rapidly deteriorates and is subject to detachment and transport, which can result in sediment reaching streams. Weathered granitic bedrock has low inherent fertility and is droughty.

J. (861) Rogue General Unit (W-15 on MFP Step 1 Overlay)

1. Timber Harvest and Site Preparation on or Above Slide-Prone Areas

Partial cut using a full suspension yarding system where possible. Actively moving areas or areas traversed by roads should not be harvested.

2. Timber Harvest Site Preparation and Removal of Brush or Hardwoods

Partial cut using full or partial suspension systems on slopes exceeding 70 percent. Most critical conditions exist on south and west exposures where the annual rain fall is less than 35 inches.

Minimize downhill yarding.

Limb all trees before yarding.

3. Timber Harvest and Site Preparation on Slopes Exceeding 20 Percent

Limit tractor logging to slopes less than 20 percent. Remove blades from tractors during logging operations.

Waterbar and revegetate skid roads immediately following logging.

4. Timber Harvested Bug-Killed Timber

Evaluate bug-killed timber thoroughly before removing dead and dying trees to determine cause of insect infestation. Remove dead and dying timber by methods that minimize surface disturbance (i.e., suspension systems).

5. Site Preparation on Sandy Granitic Soils

Use herbicides or other means as alternatives to burning or scarification.

6. Road Construction on Steep Slopes

Avoid locating roads on slopes exceeding 70 percent and on areas exhibiting instability. Roll the road grade, taking advantage of natural benches, ridges, and other stable positions.

7. Roadfills Crossing Drainages

Fills must be designed for stability when saturated and for overtopping. Rock fills are simple and effective. Bridging across debris channels is a viable alternative.

8. Compact Roadfills

Compact all fills to a degree consistent with design standards and material properties.

9. Road Construction Requiring Large Cuts and Fills

Construct cut slopes as steep as possible consistent with subsurface strength conditions. Multiple cut slopes should be constructed when weak overburden requires it and it is practical (i.e., natural ground slope makes it feasible). Buttress stability problems.

10. Road Design

Outslope all roads except where road grades exceed 8 percent and where crossing drainages.

11. Off-Road Vehicle (ORV) Use

ORV's (4-wheel drives and motorbikes) should be limited to surface roads. Discourage travel on skid roads, unsurfaced haul roads, and unroaded areas.

12. Granite Pits

Shape, mulch, seed, and fertilize granite material sites prior to abandonment. Refertilize at 3 to 5 year intervals.

Droughty conditions may require watering to maintain vegetation.

Construct and maintain sediment traps on all streams within the watershed influenced by granite pits.

Reasons

1. Clearcutting on or above debris slide prone areas will substantially increase the probability of massive failure.

2. Excessive ground disturbance from using a ground lead harvesting system or clearcutting or removing brush or hardwood on very steeply sloping ground exposes the soil to raindrop splash erosion and initates soil raveling. The soil fines are removed and the available water capacity is reduced. Once these processes begin, it is difficult to reestablish protective vegetative cover.

Uphill yarding results in less surface disturbance than downhill yarding. Removal of limbs will reduce yarding disturbance.

3. Tractor logging on slopes over 20 percent results in surface soil displacement and destruction of protective vegetation. Bare, compacted, and disturbed soils are subject to erosion and subsequent water quality degradation.

4. Harvesting bug-killed timber may increase the mass failure hazard. Dead and dying timber is often on unstable positions created by a watertable that weakened the timber and encouraged insect infestation.

5. Broadcast burning on harvested areas will remove the duff, thereby promoting excessive erosion and reducing site productivity.

6. Road construction on slopes exceeding 70 percent which requires deep fills and/or high cuts, and on those areas showing evidence of instability, will result in substantial increases of massive failure.

7. All fills crossing drainages within this general soil unit must be viewed as acting as debris dams during their life. Slides occurring in drainageways will plug culverts resulting in road failures.

8. Granitic soils are subject to piping in uncompacted fills.

9. Large cuts and fills ravel and produce considerable sidecast, which buries downslope vegetation and creates a droughty condition, resulting in reduced site quality.

10. Inslope roads concentrate water in areas where water is not normally concentrated or cause concentrations which exceed those normally experienced

during periods of peak discharge. Granitic soils, being low in clay, lack internal stability and are easily eroded when subjected to water concentration.

11. ORV use increases overland flow by removing the protective duff layer and compacting of the soil, therby increasing erosion. Granite soils lack sufficient cohesion due to small amounts of clay and sill; therefore, individual particles are easily detached and transported by water.

12. Granite bedrock, when exposed to weathering by water and temperature changes, rapidly deteriorates and is subject to detachment and transport, which can reuslt in sediment reaching streams. Weathered granitic bedrock has low inherent fertility and is droughty.

K. 824-825 General Unit (W-16 on MFP STep 1 Overlay)

Recommended Practice

1. Timber Harvest, Site Preparation and Removal of Brush or Hardwoods

Partial cut or avoid cutting on slopes exceeding 80 percent.

Use a suspension cable or aerial harvesting system.

Directional fall trees to the lead.

Limb all trees before yarding.

2. Timber Harvest and Site Preparatiopn on Shallow Soils

Avoid tractor logging where shallow soils occur (i.e., on ridge crest and steep slopes).

3. Site Preparation on Shallow Soils

Use alternative to burning (such as herbicides) in site preparation.

4. Road Consturction Through Steep Area

Confine roads to slopes less than 80 percent. Roll the road grade taking advantage of stable position (i.e., ridges, saddles, and antural benches).

5. Road Construction Through Dipped Bedding Planes

Locate roads through areas where the bedding planes or weathering surfaces are not inclined with the slope. Existing road cuts in the area of proposed road location offer helpful clues to the orientation of bedding planes.

Reasons

1. Excessive ground disturbance from using a ground lead harvesting system or clear cutting or removal of brush and hardwoods on slopes in excess of 70 percent will expose soil to raindrop splash erosion and initiate soil raveling. The soil fines are removed and the available water capacity is reduced (especially critial on droughty south and west exposures). Once these processes begin, it is difficult to reestablish protective vegetative cover.

2. Tractor logging on ridge crests and steep slopes occupied by shallow gravelly soils will remove the duff layer and surface soil which protects the underlying soil layer from erosion by water and raveling. Removing the duff layer and surface soil will reduce site productivity and degrade water quality.

3. Broadcast burning on gravelly soils on steeply sloping south and west exposures will also remove the duff layer, thereby promoting excessive erosion and reducing site productivity.

4. Road construction on slopes exceeding 80 percent produces very gravelly sidecast material that buries downslope vegetation and creates a droughty condition, resulting in reduced site quality. Sidecast can cause overloading of the fill slope and subsequent failure.

5. Roads constructed through steeply sloping terrain where bedding planes or weathering surfaces are inclined with the slope are subject to massive failure.

APPENDIX E

BLM Form 5450-3

Contract For Sale of Timber

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

No. TS

CONTRACT FOR THE SALE OF TIMBER

LUMP SUM SALE

THIS CONTRACT is made and entered into the day of , 19 , under the authority of the Act of August 28, 1937, (50 Stat. 874), as amended, (43 U.S.C. Sec. 1181a–f), relating to the revested Oregon and California Railroad and reconveyed Coos Bay Wagon Road grant lands, or under the Act of July 31, 1947, (61 Stat. 681), as amended, (30 U.S.C. Secs. 601–604), relating to other lands under the jurisdiction of the Bureau of Land Management, and the regulations as set forth in 43 CFR Group 5400, between the UNITED STATES OF AMERICA, hereinafter called the Government, acting through the Bureau of Land Management, and

of ,

hereinafter called the Purchaser.

WITNESSETH, That the parties hereto do mutually agree as follows:

Sec. 1. *Timber Sold.* The Government hereby sells to the Purchaser and the Purchaser hereby buys from the Government, under the terms and conditions of this contract, all timber, except that reserved to the Government under Sec. 40 of this contract, within the area designated by the Government, comprising the contract area* and situated in the County of ,

State of , and described as follows:

TOWNSHIP	RANGE	SECTION	SUBDIVISION(s)

Sec. 2. Total Purchase Price — Purchaser agrees to pay Government, as the total purchase price for the timber sold hereunder, the sum of

dollars

($); *Provided, however,* that such total purchase price may be adjusted in accordance with Secs. 6, 7, 8, 9, 19, 20, or 41 of this contract.

Sec. 3. Payment

(a) Payments under this contract shall be made as set forth in this section.

(b) Unless total purchase price is paid on or before the date this contract is signed by the Authorized Officer, payments shall be made in installments of not less than

dollars

($) as follows: (1) Except as provided in subsection (c) of this section, the first installment shall be paid on or before the date this contract is signed by the Authorized Officer; (2) Except as provided in subsection (c), (d), and (e) of this section, the second installment shall be paid prior to cutting or removal of any timber sold under this contract. Each subsequent installment shall become due and payable without notice whenever the value of timber cut or removed equals the sum of the second and subsequent installments paid by Purchaser. No timber may be cut or removed until such payment has been made. Purchaser shall continue to make such installment payments until the total purchase price has been paid.

(c) Payment of the first installment, required in subsection (b) of this section, may be delayed if Purchaser increases the performance bond as permitted by Sec. 38(b); *Provided, however,* that cash payment for said installment must be made (1) before cutting or removal of the last portion of timber sold having a value equal to the amount of the first installment, or (2) at any time when Government exercises its authority to cancel the rights of Purchaser in accordance with Sec. 10(a), whichever occurs first.

(d) If Purchaser increases its performance bond, as permitted by Sec. 38(c), cutting of timber of a value not in excess of the increase in value of such bond may be permitted prior to payment of the second or subsequent installments; *Provided, however,* that no timber may be skidded or yarded to a loading point or removed from the contract area prior to payment of any installment which, but for the provisions of this subsection, would otherwise be due under the provisions of Sec. 3(b).

(e) If Purchaser provides a payment bond, as permitted by Sec. 38(e), cutting and/or removal of timber of a value not in excess of the penal sum of such bond may be permitted prior to the payment of the second or subsequent installments. Unless a shorter period is agreed to by Purchaser and Government, Government shall bill Purchaser monthly for timber skidded or yarded to a loading point or removed from the contract area. Such billing shall include any amount due for related road maintenance fees. Purchaser shall make payment within fifteen (15) days of the billing date shown on the billing form.

(f) For the purpose of determining (1) when payments are due or (2) the value of timber subject to any special bonding provision, Government shall calculate the value of timber in accordance with the provisions of *Exhibit B,* which is attached hereto and made a part hereof.

(g) Purchaser shall pay the total purchase price not later than the expiration of the time for cutting and removal as set forth in Sec. 4. Purchaser shall make all payments at the office of Authorized Officer in cash, or by money order, bank draft, or check made payable to the Bureau of Land Management.

(h) For any payments or other charge not paid when due, interest shall accrue on the unpaid amount at the rate of six (6) percent per annum, beginning fifteen (15) calendar days after the end of the payment period.

Sec. 4. Time for Cutting and Removal — Except as otherwise provided in this contract, Purchaser may begin cutting and removing timber sold under this contract on the date this contract is signed by the Authorized Officer. Purchaser's right to cut and remove such timber shall expire

( ) months

after such date; *Provided, however,* extensions of time may be granted as provided in Sec. 9.

Sec. 5. Definitions

(a) *Authorized Officer* — any employee of the Bureau of Land Management to whom has been delegated the authority to take action in connection with this contract.

(b) *Timber* — standing trees, downed trees, or logs, which are capable of being measured in board feet.

(c) *Loading point* — any landing or other area in which logs are capable of being loaded for transportation out of the contract area; *Provided, however,* that right-of-way timber which has been cut shall not be considered to be at a loading point until such time as logs from any source are actually transported over that portion of the right-of-way.

Sec. 6. Inspection of Timber and Disclaimer of Warranty

(a) Purchaser warrants that this contract is accepted and executed on the basis of its examination and inspection of the timber sold under this contract and its opinion of the value thereof.

(b) Government expressly disclaims any warranty of fitness of the timber for any purpose; all timber sold hereunder is accepted *As Is* without any warranty of merchantability by Government. Any warranty as to the quantity or quality of the timber sold hereunder is expressly disclaimed by Government. Refund to or recovery by Purchaser for failure of title to any timber sold hereunder shall not exceed the value of such timber computed at prices per unit for species involved as set forth in *Exhibit B.*

Sec. 7. Passage of Title and Risk of Loss — Title to timber sold under this contract shall remain in Government and shall not pass to Purchaser until such timber has been paid for and removed from the contract area. Unless cut timber is sold under this contract, risk of loss shall be borne by Purchaser after the timber is cut; *Provided, however,* that if loss results from a fire which was not caused by Purchaser, his contractors, subcontractors, or the employees of any of them, the risk of loss shall be borne by the party holding title. If cut timber is sold under this contract, risk of loss shall be borne by the party holding title. Risk of loss to Government shall

* *General location of contract area is shown on map marked Exhibit A which is attached hereto and made a part hereof*

not exceed the value of such timber computed at the prices per unit for the species involved as set forth in *Exhibit B*. Nothing herein shall be construed to relieve either party from liability for any breach of contract or any wrongful or negligent act. As used in this section, the term *cut timber* refers only to timber which has been felled, bucked, or otherwise severed by direct human activity prior to the date this contract was entered into.

Sec. 8. Sales of Additional Timber – If the Authorized Officer and Purchaser agree that additional timber should be removed and the Authorized Officer determines that the sale will not be detrimental to the interests of Government and is within the provisions of 43 CFR 5402.0–6, the Authorized Officer shall grant written permission to Purchaser to cut and remove such timber. If permission is granted, Purchaser shall pay for such timber at a price determined by the Authorized Officer in accordance with the Bureau of Land Management prescribed procedures. The value and volume of such timber shall be added to *Exhibit B* and the value thereof shall be added to total purchase price in Sec. 2. Payment for such timber shall be made in accordance with Sec. 3(b) or 3(e), except that, if all contract payments required by Sec. 3(b) or 3(e) have been made, payment for such timber shall be made in advance as a condition of granting such permission.

Sec. 9. Extension of Time and Reappraisal – If Purchaser shows that delay in cutting and removal was due to causes beyond his control and without his fault or negligence, the Authorized Officer may grant an extension of time, not to exceed one year, upon written request of Purchaser. Such written request shall be filed with the Authorized Officer prior to the expiration of the time for cutting and removal expressed in Sec. 4. If an extension of time is granted, as provided in this section, timber remaining on contract area shall be reappraised by the Authorized Officer, using Bureau of Land Management prescribed procedures, and the total purchase price adjusted accordingly; *Provided, however,* no adjustment shall be made by reason of timber being enhanced in value by Purchaser, nor shall the reappraised total purchase price be less than the total purchase price in effect during the original time for cutting and removal or the last extension. The Authorized Officer may require that the reappraised total purchase price shall be paid in advance as a condition of granting an extension. Market fluctuations shall not be cause for consideration of contract extensions.

Sec. 10. Violations, Suspension, and Cancellation

(a) If Purchaser violates any provision of this contract, the Authorized Officer may, by written notice, suspend any further operations of Purchaser under this contract, except such operations as may be necessary to remedy the violation. If Purchaser fails to remedy the violation within thirty (30) days after receipt of a suspension notice, the Authorized Officer may, by written notice, cancel the rights of the Purchaser under this contract and take appropriate action to recover all damages suffered by Government by reason of such violation, including application toward payment of such damages of any advance payments and any performance bonds or, where applicable, any payment bonds; *Provided, however,* that if the violation involves nonpayment of amounts due for timber cut and/or removed under a payment bond of a corporate surety, the Authorized Officer must, in addition to the above requirements, allow sixty (60) days after making demand upon surety for any payment due before cancelling the rights of Purchaser.

(b) If Purchaser cuts or removes any timber sold under this contract during any period of suspension, such cutting or removal shall be considered a wilful trespass and render Purchaser liable for damages under applicable law. Any payment made for purchase price of timber cut or removed in trespass shall be deducted to the extent of single damages or the value of timber under this contract, whichever is lesser, from amount due because of trespass.

(c) If Purchaser's operations are suspended because of Purchaser's failure to make an installment payment when due, the Authorized Officer may require Purchaser to pay the entire remaining balance of the purchase price as a condition of terminating the suspension.

(d) If Purchaser, his contractors, subcontractors, or the employees of any of them, cuts, injures, or removes any Government timber reserved under this contract, they shall fully cooperate, upon request of the Authorized Officer, in the investigation of such acts. If in the opinion of the Authorized Officer, full cooperation is not received or will not be forthcoming, he may suspend that portion of Purchaser's operations necessary to preserve evidence pending investigation or permit safe investigation of such acts.

Sec. 11. Credit Against Purchase Price – If the time specified for cutting and removal of timber has expired or the rights of Purchaser have been cancelled, Purchaser shall be entitled to a credit against any amount which is due and owing Government for timber remaining on the contract area. The Authorized Officer shall determine the credit value of the remaining timber as soon as possible after the date of expiration or cancellation. Credit value of the remaining timber shall be total market value, as established by the Authorized Officer by reappraisal or resale, or total value based upon contract unit prices, whichever is less. There shall be deducted from credit value such amounts as the Authorized Officer determines adequate to cover costs to Government resulting from Purchaser's failure to perform, including but not limited to costs of appraising and administering any resale of timber.

Sec. 12. Responsibility for Damage Suffered, Cost, or Expense Incurred by Government – Purchaser shall be liable for any damage suffered, cost, or expense incurred by Government arising out of any operations under this contract whenever such damage, cost, or expense results from any breach of contract or wrongful or negligent act of Purchaser, his contractors, subcontractors, or the employees of any of them. Purchaser shall pay Government for such damage, cost, or expense after written demand therefor by the Authorized Officer.

Sec. 13. Timber Trespass – If in connection with operations hereunder Purchaser, his contractors, subcontractors, or the employees of any of them, cuts, injures, or removes any Government timber, other than timber sold under this contract, Purchaser shall be liable for damages under applicable law. Purchaser shall pay Government for such damages after written demand therefor by the Authorized Officer.

Sec. 14. Protection of Utilities and Improvements – Existing telephone, telegraph and transmission lines, fences, ditches, roads, trails, and other improvements shall be protected as far as practicable in all phases of Purchaser's construction or logging operations. All roads and trails, designated by the Authorized Officer as needed for fire protection or other purposes, shall be kept free of logs, slash, and debris. Damage to utilities and improvements shall be promptly paid for or repaired to a condition which, in the opinion of the Authorized Officer, is at least as good as the condition just prior to such damage.

Sec. 15. Fire Prevention and Slash Disposal – Purchaser shall take such measures for prevention and suppression of fire on the contract area and other adjacent Government lands or other Government lands used or traversed by Purchaser in connection with operations as are required by applicable laws and regulations. *However,* when in the opinion of the Authorized Officer, weather and other conditions affecting fire incidence and control make special precautions necessary to protect the contract area and said Government lands, Purchaser shall take such additional or other fire prevention and control measures as may be required by the Authorized Officer. Disposal of slash shall be done in accordance with a plan approved by the Authorized Officer.

Sec. 16. Construction, Use and Maintenance of Roads and Facilities

(a) Subject to the written approval of and regulation by the Authorized Officer, Purchaser may: (1) construct and use any new roads and facilities not otherwise provided for in this contract, and (2) use any existing roads and facilities not otherwise provided for in this contract.

(b) Except as provided in Sec. 12, Purchaser shall perform or pay for repair and maintenance of any road or facility used under the terms of this contract in accordance with the requirements of Sec. 41; *Provided, however,* that Purchaser shall not be responsible for maintenance or repair of wear or damage caused by third parties, or maintenance or repair which exceeds the standards of required maintenance shown in Sec. 41; and *Provided, further,* that Purchaser's responsibility under this provision shall not commence prior to the date on which he first begins operations and shall cease upon completion and written acceptance of all contract requirements other than slash disposal, except for maintenance and repair of damages resulting from Purchaser's slash disposal activities.

Sec. 17. Limitations of Road Use

(a) Purchaser's right under this contract to use existing Government roads described herein, or roads to be constructed, is limited to removal of timber sold under this contract; *Provided, however,* that this provision shall not limit any right to use Government roads or rights-of-way which have been granted to Purchaser pursuant to 43 CFR Group 2800.

(b) For the purpose of protecting roads described herein, Purchaser shall immediately discontinue use of said roads upon receipt of written notice that the Authorized Officer has determined that continued use will cause excessive damage to said roads.

Sec. 18. Acceptance of Road Construction

(a) Whenever Purchaser shall deliver to the Authorized Officer a written statement that the road construction is complete, pursuant to the contract terms, the Authorized Officer shall promptly inspect such road. If the contract road construction requirements have been completed to the satisfaction of the Authorized Officer, Purchaser will be given written notice of acceptance, and, except as provided in Sec. 12, be released from further liability or duty for construction or reconstruction of such road.

(b) Notwithstanding acceptance of any road under this section, Purchaser shall remain liable for maintenance and repair of any such road in accordance with the provisions of Sec. 16.

Sec. 19. Cost Adjustment for Physical Changes – If, prior to acceptance of a road under Sec. 18, a major physical change, caused by a single event, and not due to negligence of Purchaser, his contractors, subcontractors, or the employees

of any of them, results in additional work by Purchaser involving an additional estimated cost of more than (1) $1,000 for sales under one million board feet; (2) $1.00 per thousand board feet for sale of one to three million board feet; or (3) $3,000 for sales over three million board feet, Government shall become responsible for any estimated cost which exceeds the above amounts. Government may elect to meet its share by reducing the purchase price or by payment of such cost to Purchaser or by performing its share of the necessary work. The estimated cost of additional work shall be calculated by the Authorized Officer using Bureau of Land Management prescribed appraisal procedures. Such cost shall include the cumulative estimated costs of repairing damage from slides, washouts, landslips, fire, etc. caused by said event. If necessary, plans and specifications shall be revised to meet the new conditions. Purchaser must obtain advance approval from the Authorized Officer for such additional work in order for Purchaser to be eligible for cost adjustment under this section.

Sec. 20. Design Change — If Purchaser and the Authorized Officer agree on a design change of a substantial nature in any road, road structure, or bridge required to be constructed or improved under the terms of this contract, the total purchase price shall be revised to reflect the estimated increase or decrease in cost resulting from such design change. A design change of substantial nature is one that would result in a cost adjustment of $1,000 or more.

Sec. 21. Rights and Obligations After Time for Removal of Personal Property or Cancellation of the Rights of the Purchaser — If any of Purchaser's obligations remain unperformed after expiration of the time for removal of personal property, as set forth in Sec. 39, or if the rights of Purchaser under this contract have been cancelled by Government, all provisions of this contract for the benefit and protection of Government or third parties shall remain in effect until this contract is terminated in its entirety by Government.

Sec. 22. Protection of Survey Monuments, Witness Corners, Reference Monuments, and Bearing Trees — Purchaser shall protect all survey monuments, witness corners, reference monuments, and bearing trees against destruction, obliteration, or damage during operations on the contract area. If any monuments, corners, or accessories are destroyed, obliterated, or damaged by such operations, Purchaser shall hire an appropriate county surveyor or registered land surveyor to reestablish or restore the monuments, corners, or accessories, at the same location, using surveying procedures in accordance with the *Manual of Instructions for the Survey of the Public Lands of the United States*, and shall record such survey in appropriate county records. The Authorized Officer may prescribe in writing additional requirements for protection of monuments, corners, and bearing trees.

Sec. 23. Purchaser's Representative — At all times when construction or logging operations are in progress, Purchaser shall have a representative readily available in the area of such operations who shall be authorized to receive, in behalf of Purchaser, any notices or instructions from the Authorized Officer in regard to performance under this contract. Purchaser shall take such action as is required by the terms of this contract.

Sec. 24. Simultaneous Use of Contract Area by Others — If the Authorized Officer determines that other use of the contract area will not seriously interfere with the operations of Purchaser, he may issue permits, leases, or contracts for the simultaneous use of the contract area by others.

Sec. 25. Watershed Protection: Water Quality, Erosion Control and Soil Damage

(a) Purchaser shall comply with all applicable State and Federal laws and regulations pertaining to water quality in connection with any operations under this contract.

(b) Purchaser shall take every reasonable precaution not to pollute or obstruct any stream, lake, or reservoir on or near the contract area in connection with any operations under this contract. If Purchaser's operations cause pollution or obstruction of any stream, lake, or reservoir on or near the contract area, Purchaser shall correct the condition to the satisfaction of the Authorized Officer.

(c) Purchaser shall undertake every reasonable measure to minimize erosion and soil damage in connection with any operations under this contract, including but not limited to construction of water bars on yarding and spur roads as designated by the Authorized Officer. Purchaser shall immediately discontinue any construction or timber harvesting operations under this contract, upon receipt of written notice from the Authorized Officer that due to weather or soil moisture conditions, such operations will cause excessive damage to the soil. The Authorized Officer shall notify Purchaser, in writing, when such operations may be resumed.

Sec. 26. Refuse Control and Disposition of Waste Materials

(a) Purchaser shall, to the satisfaction of the Authorized Officer, remove, or otherwise dispose of all garbage, temporary buildings, trash, litter, discarded equipment or parts, waste materials or other refuse resulting from Purchaser's operations. Areas for disposal of waste material shall be subject to approval of the Authorized Officer.

(b) Waste materials, such as garbage, trash, oil, grease, chemicals and similar substances shall be disposed of in a manner that will prevent their entry by drainage, high water, or other means into any river, watercourse, lake, or reservoir in or near Purchaser's operations. Water used to wash down equipment used for petroleum products, industrial chemicals, cement or other toxic materials shall be disposed of in a manner that will prevent their entry into any watercourse or waterway.

Sec. 27. Storage and Handling of Hazardous Materials — All petroleum products, industrial chemicals and similar toxic or volatile materials stored by Purchaser on or near the contract area, in connection with operations under this contract, shall be stored in durable containers and shall be stored in areas, as determined by the Authorized Officer, which are either located so that any accidental spillage will not drain into any watercourses, lakes, or reservoirs or, when such areas are not available, shall be stored in an area surrounded by impermeable containment dikes of sufficient capacity to contain the aggregate capacity of all tanks.

In addition, Purchaser shall comply with all applicable State and Federal laws and regulations concerning the storage, handling, use and disposal of industrial chemicals, pesticides, herbicides, and other hazardous substances.

Sec. 28. Safety and Health — Purchaser shall conduct all operations in connection with this contract in compliance with the applicable provisions of Federal, State, and local safety, health and sanitation laws, codes, and regulations and shall make it possible for the Authorized Officer to inspect such operations.

Sec. 29. Equal Opportunity — During the performance of this contract, Purchaser agrees as follows:

(a) Purchaser will not discriminate against any employee or applicant for employment because of race, color, religion, sex or national origin. Purchaser will take affirmative action to ensure that applicants are employed, and that employees are treated during employment, without regard to their race, color, religion, sex or national origin. Such action shall include, but not be limited to the following: employment, upgrading, demotion, or transfer; recruitment or recruitment advertising, layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship. Purchaser agrees to post in conspicuous places, available to employees and applicants for employment, notices to be provided by the contracting officer setting forth the provisions of this section.

(b) Purchaser will, in all solicitations or advertisements for employees placed by or on behalf of Purchaser, state that all qualified applicants will receive consideration for employment without regard to race, color, religion, sex or national origin.

(c) Purchaser will send to each labor union or representative of workers with which he has a collective bargaining agreement or other contract or understanding, a notice, to be provided by the agency contracting officer, advising the labor union or workers' representative of Purchaser's commitments under this section, and shall post copies of the notice in conspicuous places available to employees and applicants for employment.

(d) Purchaser will comply with all provisions of Executive Order No. 11246 of September 24, 1965, as amended, and of the rules, regulations, and relevant orders of the Secretary of Labor.

(e) Purchaser will furnish all information and reports required by Executive Order No. 11246 of September 24, 1965, as amended, and by the rules, regulations, and orders of the Secretary of Labor, or pursuant thereto, and will permit access to his books, records, and accounts by the contracting agency and the Secretary of Labor for purposes of investigation to ascertain compliance with such rules, regulations, and orders.

(f) In the event of Purchaser's noncompliance with this section, contract may be cancelled, terminated or suspended in whole or in part and Purchaser may be declared ineligible for further Government contracts in accordance with procedures authorized in Executive Order No. 11246 of September 24, 1965, as amended, and such other sanctions may be imposed and remedies invoked as provided in Executive Order No. 11246 of September 24, 1965, as amended, or by rule, regulation, or order of the Secretary of Labor, or as otherwise provided by law.

(g) Purchaser will include the provisions of paragraphs (a) through (g) in every subcontract or purchase order unless exempted by rules, regulations, or orders of the Secretary of Labor issued pursuant to Section 204 of Executive Order No. 11246 of September 24, 1965, as amended, so that such provisions will be binding upon each subcontractor, or vendor. Purchaser will take such action with respect to any subcontract, or purchase order, as the contracting agency may direct as a means of enforcing such provisions including sanctions for noncompliance: *Provided, however*, that in the event the Purchaser becomes involved in, or is threatened with, litigation with a subcontractor, or vendor as a result of such direction by the contracting agency, Purchaser may request the United States to enter into such litigation to protect the interests of the United States.

Sec. 30. Records and Reports — Upon request of the Authorized Officer, Purchaser shall furnish the following records and reports: (1) volume or quantity of timber cut and removed from the contract area; (2) road costs including road use fees paid in connection with removing timber from the contract area; and (3) prices received for lumber or other wood products.

Sec. 31. Unsatisfactory Bond — Whenever any performance or payment bond furnished under this contract becomes unsatisfactory to the Authorized Officer, he may require a new bond which is satisfactory to him.

Sec. 32. Assignments

(a) Purchaser may not assign this contract or any interest therein without written approval of the Authorized Officer. An assignment shall contain all the terms and conditions agreed upon by the parties thereto.

(b) The Authorized Officer will not approve any assignment involving contract performance unless assignee: (1) is authorized to transact business in the State indicated in Sec. 1; (2) submits such information as is necessary to assure the Authorized Officer of his ability to fulfill the contract; and (3) furnishes a performance bond as required by Sec. 38 or obtains a commitment from the previous surety to be bound by the assignment when approved. Upon approval of an assignment by the Authorized Officer, the assignee shall be entitled to all the rights and subject to all the obligations of this contract and the assignor shall be released from any further liability under this contract.

Sec. 33. Contingent Fees — Purchaser warrants that no person or agency has been employed or retained to solicit or secure this contract upon an agreement or understanding for a commission, percentage, brokerage, or contingent fee excepting bona fide employees or bona fide established commercial agencies maintained by Purchaser for the purpose of securing business. For breach or violation of this warranty, Government shall have the right to cancel this contract without liability or, in its discretion, to require Purchaser to pay, in addition to the contract price or consideration, the full amount of such commission, percentage, brokerage, or contingent fee.

Sec. 34. Successors in Interest — Every obligation hereunder shall extend to and be binding upon the successors in interest of the parties hereto and every benefit hereunder shall inure to such successors.

Sec. 35. Exercise of Rights or Duties of the Authorized Officer — The rights or duties of the Authorized Officer may be exercised by the Authorized Officer or his designated representative.

Sec. 36. Officials not to Benefit — No Member of, or Delegate to Congress, or Resident Commissioner, after his election or appointment, or either before or after he has qualified and during his continuance in office, and no officer, agent, or employee of the Department of the Interior, except as provided in 43 CFR 7.4, shall be admitted to any share or part in this contract or derive any benefit that may arise therefrom; and the provisions of Section 3741 of the Revised Statutes of the United States, as amended (41 U.S.C. Sec. 22), and Sections 431, 432, and 433, Title 18, U.S.C., relating to contracts, enter into and form a part of this contract so far as the same may be applicable.

Sec. 37. Appeal — An appeal may be taken from any decision of any officer of the Bureau of Land Management to the Board of Land Appeals pursuant to the Rules of Practice (43 CFR Part 4 Subpart E).

Sec. 38. Bond

(a) A performance bond shall be filed by Purchaser on or before the date this contract is signed by the Authorized Officer in the amount of

dollars ($).

(b) If Purchaser elects to increase the amount of the performance bond required above by an amount equal to the first installment, in order to secure the delayed payment of said installment, as provided in Sec. 3(c), increased bond shall be on a form approved by the Director of the Bureau of Land Management which upon completion must be approved, in writing, by the Authorized Officer. If a corporate surety bond is used, the bond shall provide that the Surety will pay to Government the amount of the increase within sixty (60) days after demand by Government whenever the Principal shall fail to make payment as required in Sec. 3(c).

(c) If Purchaser elects to cut timber before payment of the second or subsequent installments, Purchaser shall increase the amount of the required performance bond by an amount equal to one or more installments, as set forth in Sec. 3(b). The adjusted bond must be approved, in writing, by the Authorized Officer prior to cutting any timber under the adjusted bond. The increased amount of bond shall be used to assure payment for such timber. Timber cut pursuant to this subsection may be paid for in installments. Upon payments, the increased amount of bond may be applied to other timber sold under this contract to permit its cutting in advance of payment.

(d) As contract provisions are completed to the satisfaction of the Authorized Officer, he may, in his discretion, reduce amount of performance bond required; *Provided, however,* the performance bond may not be reduced below the amount of

dollars ($)

until total purchase price has been paid. The performance bond shall be forfeited to the amount of damages, determined by the Authorized Officer if all contract provisions are not faithfully and fully performed by Purchaser. If the amount of damages exceeds the amount of the bond, Purchaser hereby agrees to pay the excess. Upon satisfactory performance of all provisions of this contract, the bond shall be cancelled or, if cash or negotiable securities are furnished in lieu of a performance bond, such cash or negotiable securities shall be returned to Purchaser. In event of litigation, any determination by the Authorized Officer as to the amount of damages will be subject to review by a court of competent jurisdiction.

(e) If Purchaser elects to: (1) cut and remove timber or (2) remove timber already cut which has been secured by an increased performance bond as provided in Sec. 38(c), before payment of the second or subsequent installments, Purchaser shall obtain a payment bond in an amount equal to one or more installments as set forth in Sec. 3(b). The payment bond must be approved, in writing, by the Authorized Officer prior to cutting or removing any timber under the bond. The amount of the bond shall be used to assure payment for such timber, *Provided, however,* that such bond shall be considered as payment under Sec. 7, for the purpose of passing title and risk of loss to timber sold. Timber cut pursuant to this subsection shall be paid for as provided in Sec. 3(e). Upon payment, the amount of the bond may be applied to other timber to permit its cutting and/or removal in advance of payment. If a bond of a corporate surety is used, it shall provide that, if Purchaser fails to make payment as required by Sec. 3(e), the surety will make such payment including interest as specified in Sec. 3(h), to Government within sixty (60) days after demand by Government.

Sec. 39. Time for Removal of Personal Property — Purchaser shall have the right within ( ) months after expiration of time for cutting and removal to remove his equipment, improvements, or other personal property from Government lands or rights-of-way; *Provided, however,* that any improvements such as road surfacing, culverts and bridges which have become a permanent part of a Government road, shall not be removed. The Authorized Officer may, in his discretion, grant an extension of time, not to exceed three (3) months for removal of personal property. Any equipment, improvements, or other personal property remaining on Government lands and rights-of-way at the end of the period for removal, or any extension, shall become the property of Government.

Sec. 40. Timber Reserved from Cutting — The following timber on the contract area is hereby reserved from cutting and removal under the terms of this contract and is retained as the property of Government.

Sec. 41. Special Provisions — Purchaser shall comply with the special provisions which are attached hereto and made a part hereof unless otherwise authorized, in writing, by the Authorized Officer.

IN WITNESS WHEREOF, the parties hereto have executed this contract as of the day first above written.

If Individual or Partnership, sign here:	If Corporation, sign here:
(Name of Firm)	(Name of Corporation)
(Name)	(Name)
(Address)	(Title)
(Name)	UNITED STATES OF AMERICA
(Address)	By (Name)
(Name)	(Title)
(Address)	(Date)

(If Purchaser is a corporation, the following certificate must be executed by the Secretary or Assistant Secretary of the Corporation)

I, , certify that I am the Secretary of the corporation named as Purchaser herein; that , who signed the contract was then of said corporation, that said contract was duly signed for and in behalf of said corporation by authority of its governing body, and is within the scope of its corporate powers.

[CORPORATE SEAL]

☆ GPO 783-514

APPENDIX F

WATER MONITORING PLAN

FOR HERBICIDE RESIDUES

SAMPLING OF STREAMS FOR HERBICIDE RESIDUE

Treatment area layout. The degree of stream contamination is greatly influenced by the orientation of the treatment unit so consider the need for monitoring when laying it out. If at all possible, spray boundaries should be laid out so that live streams are not included.

Avoiding larger streams during spray application is usually not difficult, but it may be impractical to avoid all of the small streams in an area that requires brush control. Municipal watersheds and water sources for fish hatcheries and private landowners require special attention.

Sampling points. Selection of an appropriate sampling station is extremely important since the value of the information obtained is only as good as the sample collected. The sample should be representative of the volume of water passing the sampling point, and the samples should be collected avoiding stirring up bottom sediments or kicking surface debris into the stream. When the treatment unit lies adjacent to the stream to be sampled, the sampling point must be downstream of all small side channels flowing from the treated area. At the same time, however, we want to sample the stream as close to the lower boundary as possible so that the samples will represent the maximum concentration of chemical to which aquatic organisms may have been exposed.

Control samples are collected at the sampling station prior to spraying in main stream just below confluence of all affected tributaries.

The sampling point should not be subject to contaminaton by aerial drift during the sampling period. In critical situations such as spraying brush above a water intake for a fish hatchery or private water supply, sampling stations should be established near the in intake.

Collection of samples. Before the project is begun, appropriate sample containers must be obtained. The type and size of sample, the container and conditions for storage and transport should be verified with the analytical laboratory. Herbicide samples should be taken in sterilized glass containers.

As indicated earlier, the sample should be as representative as possible of the total volume of water flowing past the collection point. Obtain an integrated sample, using a point sampler such as a DH48 sampler, obtaining an integrated sample of the stream flow. The integrated sample must transverse both the width and depth of the stream. Experienced personnel familiar with this procedure should be used.

The individual collecting the samples must not have any herbicides or other contaminants on his hands or clothing and the sample containers must also be free of contamination. These precautions are extremely critical because of the sensitivity of analytical methods.

Each sample must be clearly identified and all pertinent information correctly and completely recorded on a tag or label securely attached to the container. In addition to assigning an identifying number, the attached tag or label should show the date and time collected, location, weather conditions since time of aplication, and name of collector. Other information that may be recorded is the rate of application, chemical formulation used, and size of area treated.

Sampling Periods:

1. Previous to spraying for control purposes (water will be analyzed for all common herbicides including 2,4,5-T, Amitrole-T).

2. Immediately after spraying.

3. One day after spraying.

4. First two storm events.

5. Leaf fall.

6. Following year.

Timing of the collection of sample number 2 depends on the distance between the lower unit boundary and the sampling point. If this point is immediately below the unit, sample 2 should be taken as described. If the sampling point is downstream some distance below the unit, collection of sample 2 must be delayed to correlate with the flow duration from the time of spraying.

Samples 5 and 6 may not be taken if prior sample(s) indicate no contamination.

Due to poor weather, equipment failure, or the size of the area, it is often necessary to spray a unit over a period of several days. Should this occur during a monitoring program, samples should be taken to comply with each time that spray is applied.

When the treatment unit lies within a municipal watershed or in a watershed that supplies a fish hatchery, additional samples should be taken to comply with those users' regulations. These samples would be taken downstream just above any critical installation, such as a fish hatchery or domestic or crop use.

Transport and storage. Sample containers, whether empty or full, should not be transported or stored with chemicals. The chance of sample contamination can also be greatly reduced by assigning an experienced person who is not involved in any part of the spraying operation to sample collection and handling. As soon as sampling has been completed, the accumulated samples should be shipped to the laboratory for chemical analysis. If for some reason the samples are not analyzed immediately, storage conditions should be verified with the analytical laboratory.

SAMPLING OF PONDS, LAKES AND MARSHES FOR HERBICIDE RESIDUE

The time and procedures of sampling are much the same as that of streams.

The water samples should be representative of the water body, and the samples should be collected avoiding stirring up bottom sediments or kicking surface debris into the water. The herbicide samples should be taken in glass containers. Obtain an integrated sample, using a point sampler transversing the depth of water. Experienced personnel familiar with this procedure should be used.

The sampling periods should be the same as that of streams, except sample period 2 "Immediately after spraying" need not be adjusted because of sampling point location.

SAMPLING OF GROUND WATER FOR HERBICDE RESIDUE

Sampling of ground water rarely need be sampled except in cases of a very high water table of 10 feet or less.

If sampling is found necessary, a well or wells should be pumped until formation water is being yielded and take the sample(s) in sterilized glass containers.

Herbicides have little chance of reaching ground-water aquifers because of rapid degradation and resistance to leaching. Amongst the most mobile of the herbicides is 2,4-D with a leaching rate through soil at 6 to 8 inches with a rainfall of 50 inches. Only water tables a few feet or less below the land surface would have detectable effects on ground water in storage and almost no chance of being present in detectable amounts in water when discharged by wells, springs and into streams. Excessive concentrations of persistent herbicides may be present in areas of high water tables such as marshes.

CHEMICAL ANALYSIS

Chemical analysis for pesticide residues is an expensive proposition because of the time and equipment required. It may be desirable, therefore, to reduce the cost of monitoring on less projects by compositing some of the samples and thereby reducing the number of analyses required. This can be done by combining equal parts of each of several samples taken at a monitoring point, excluding the control sample. No more than four or five samples should be included in a composite and the remainder of each individual sample should be saved in case the analytical results on the composite show that more detailed information is needed. The composite sample must be so marked and a complete identification included with it when submitted for analysis (Norris, Moore, Thut, Freed, Lauterbach, 1971).

WATER ANALYSIS CONTACTS

1. Bacterial Water Contamination

   Testing for water quality

   Public Health Lab.
   Oregon State Health Div.
   1400 S.W. 5th Ave.
   Portland, Oregon 97201

2. Identifying sources of contamination

   Oregon State Health Division
   Community Environmental Health
   1400 S.W. 5th Ave.
   Portland, Oregon 97201

   This organization can perform tests to determine if sewage effluent is reaching streams.

3. "Water Measurement Manual"

   1953, 1271 pp.

   Bureau of Reclamation
   Denver Federal Center
   Denver, Colorado 80225

4. Analysis of Samples for Pesticide Residue

   (See att. No. 1)

   Sampling jugs cost $1.02 each
   Cost per analysis $55.87

   State Department of Agriculture
   Agriculture Building
   Salem, Oregon 97310

5. Linn-Benton Community College
   6500 S.W. Pacific Boulevard
   Albany, Oregon 97321

   (Can provide training in water quality testing, etc.)

James D. Fulton - Wastewater technology
John F. Wooley
Ph. 928-2361

6. MEI - Charlton Inc.
2340 S.W. Canyon Road
Portland, Oregon 97201
Ph. 228-9663 (See att. No. 2)

7. Loren Kramer, Director
State of Oregon
Department of Environmental Quality
1234 S.W. Morrison Street
Portland, Oregon 97205

Water Quality Control
Fred Bromfield 229-5749
Glenn Carter 229-5696

8. Regional Administrator, Region X
U.S. Environmental Protection Agency
1200 Sixth Avenue
Seattle, Washington 98101

Robert S. Burd - Director, Water Division
Bill Clothier - Non point Pollution Section 442-1086
Albert Moore - Staff
Dick Brow

John Vlastelicia, Director
Oregon Operations Office
1234 S.W. Morrison
Portland, Oregon 221-3250

EPA Pesticide Div. Oregon Office
511 N.W. Broadway
Portland, Oregon 221-2820

9. Misc. list of Pesticide Analytical Services. See att. no. 3.

10. USGS Central Lab.
1750 S. Redwood Rd.
Salt Lake, Utah

11. USGS Central Lab.
6481 Peach Tree Industrial Bld.
Doraville, Georgia

12. USGS Central Lab.
Denver Fed. Center, Bld. #15
Lakewood, Colorado

13. Umpqua Research Co.
P.O. Box 791
Myrtle Creek, Oregon

14. Most colleges and universities as:

(1) OSU Lab. at Corvallis, Oregon
(2) Portland State University
(3) Eastern Washington State College

15. Okanogan County Health Dept.
Box 646
Okanogan, Washington 98840

16. Chemical Analysis

Water Analysis
304 Blair Blvd.
Eugene, Oregon 97402

Oregon Certified Laboratory No. 72
Inv. No. 2279 - Purchase Order #36100-PH5-48

17. Northwest Testing Laboratories, Inc.
4115 N. Mississippi Ave.
Portland, Oregon 97217

18. Hibbs Laboratories
2808 Cassia Street
Boise, Idaho 83705

APPENDIX G

VISUAL RESOURCE MANAGEMENT CLASSES

VRM classes result from the interaction of scenery quality, visual zones, and sensitivity level. Specific visual resource management objectives for Classes I through V are as follows.

Class I This class provides for natural ecological changes only. It is applied to primitive areas, some natural areas, and other similar situations where management activities are to be restricted. The wild area of the Rogue River and the Brewer Spruce Natural Area are rated as Class I.

Class II This class requires management activities to be designed and located to blend into the natural landscape so they are not apparent to the casual visitor.

Class III This class provides that management activities may be evident to the casual visitor; however, the activity should remain subordinate to the visual strength and natural character of the landscape.

A management activity may repeat the dominant qualities common in the landscape and may visually change the essential character of existing dominance factors in the landscape. However, these changes must be relatively small in scale and generally subordinate to the visual strength of the natural landscape.

Class IV This class provides that management activities may be visually apparent to the casual observer and may also become dominant in the landscape.

Establishment of strong visual linkages between the management activity and the characteristic landscape is critical to reduce visible impacts. When viewed as a foreground or middleground, the management activity may be totally dominant and may not appear to completely borrow from naturally established dominance factors. However, when viewed as background, the visual characteristics of the management activity must be those of natural occurrences within the characteristic landscape.

Management activities which are visually apparent may be located in critically sensitive areas such as prominent features, long view-duration areas, enframed views, and other critical focus areas if such modifications are subject to sensitive analysis by visual design arts disciplines.

Class V This class applies to areas where the natural character has been disturbed to a point where rehabilitation is needed to bring it back into character with the surrounding countryside. This class would apply to areas identified in the scenery evaluation where the quality class has been reduced because of unacceptable intrusions. It should be considered an interim short-term classification until one of the other classes can be reached through rehabilitation.

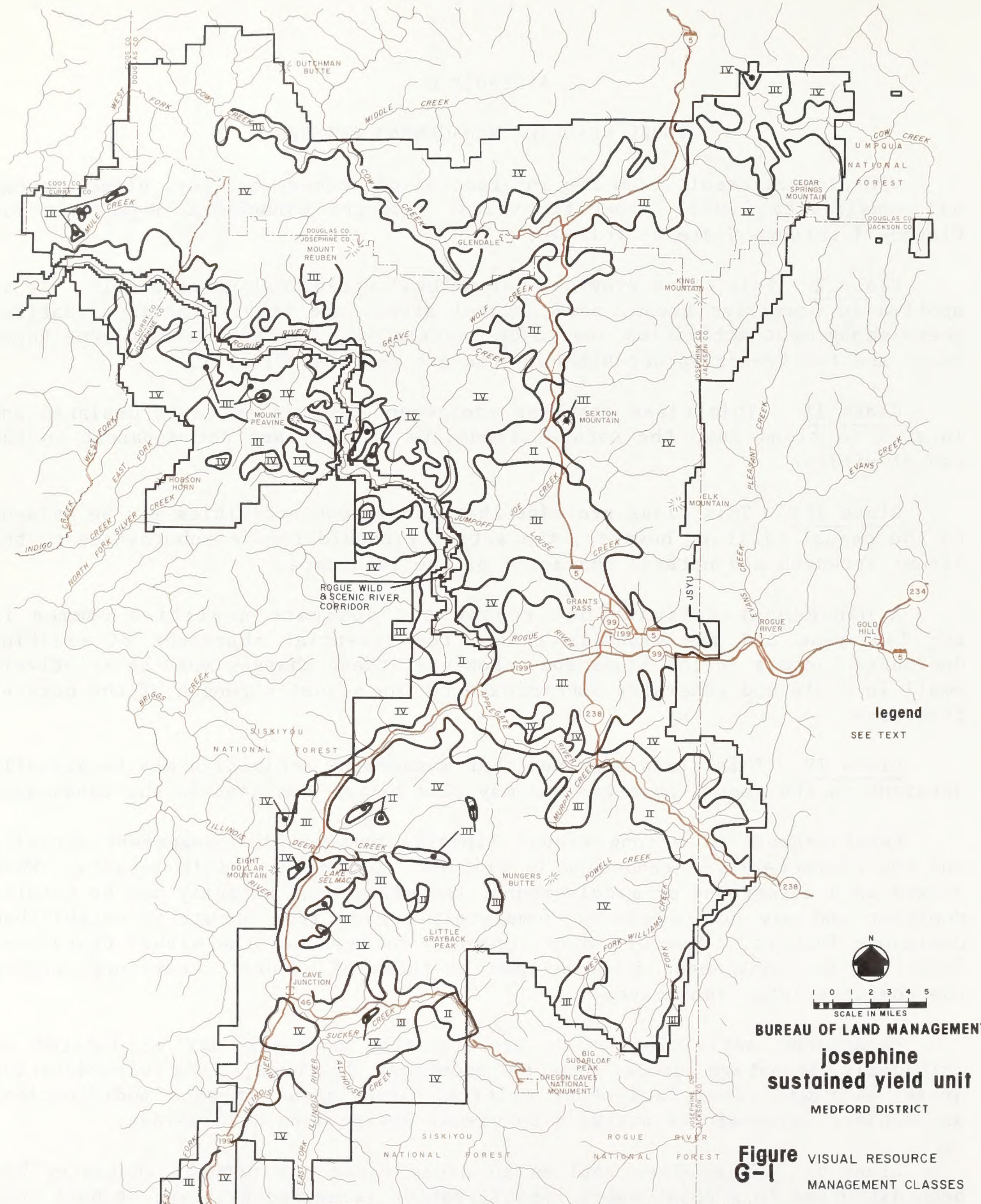


Figure G-1 VISUAL RESOURCE MANAGEMENT CLASSES

APPENDIX H

Soils of the Josephine SYU -- Their Properties and Interpretations

Soils of the Josephine Master Unit and Their Properties and Interpretations

Map Symbol	Mean Elev. (feet)	Precip. Zone (in.)	Classification Subgroup-Family-Series	Position on Landform	Parent Material	Soil Characteristics: Soil Sub-Soil	Soil Characteristics: Dominant Slope Range Percent	Soil Characteristics: Aspect	Soil Characteristics: Coarse Fragment Kind & Percent	Soil Characteristics: Profile Depth (in.)	Soil Characteristics: Permeability	Soil Qualities and Interrelations: Compaction Hazard	Soil Qualities and Interrelations: Drainage	Soil Qualities and Interrelations: Available Water Holding Capacity (in.)	Soil Qualities and Interrelations: Major Limitation
1			miscellaneous land type	flood plains of old stream terraces	holocene alluvium	-	-	-	-	-	-	-	-	-	-
R			miscellaneous land type	rock outcrop	-	-	-	-	-	-	-	-	-	-	-
370	1500-4000	35-70	Dystric Xerochrepts- -loamy-skeletal mixed mesic- -unnamed	moun-tainous slopes	mixed collu-vium	GL/L	10-85+	N. if below 2500 ft	gravel 35-75	40+	M	M	well drained	3-6	-steep
371	1500-4000	35-70	Typic Xerochrepts- -loamy-skeletal mixed fragmental, mixed mesic- -unnamed	moun-tainous slopes	mixed collu-vium	VGL/L	35-85+	N. if below 2500 ft	gravel 35-75	20-40	M	slight	well drained	3-6	-droughty -steep
372	1500-4000	35-80	Lithic Xerochrepts- -loamy-skeletal, mixed mesic- -unnamed	moun-tainous	mixed collu-vium	GL/VGCL	35-85+	N. if below 2500 ft	gravel 35-70	0-12	M	slight	well drained	3	-droughty -steep -shallow
(380)	1500-4000	35-80	Typic Haploxerults- -fine, mixed, mesic- -Pollard	moun-tainous slopes	mixed collu-vium	GL/C	35-60+	N. if below 2000 ft	gravel 5-35	40+	MS	severe	well drained	6-9	-compaction -steep -sediment
381	1500-4000	35-80	Typic Haploxerults- -clayey skeletal, mixed, mesic-unnamed	moun-tainous slopes	mixed collu-vium	GCL/VGC	35-85	N. if below 2000 ft	gravel 35-75	20-40	MS	M severe	well drained	3-6	-compaction -steep -erosion
701	1200-4000	20-35	Lithic Xerochrepts- -loamy-skeletal mixed, mesic-unnamed	moun-tainous slopes	meta-morphic collu-vium	VGL/VGL	35-85	south	gravel 35-70	12-20	M-M rapid	slight	some-what excess-ively drained	3	-droughty -erosion
(712)	1500-4000	30-50	Ultic Haploxeralfs- -fine, mixed, mesic- -Jumpoff	moun-tainous benched side-slopes	meta-morphic collu-vium	GCL/C	10-35	varies	gravel 10-35	40+	S-VS	severe	M well drained	3-6	-compaction -slumpage -erosion
(718)	1000-4000	20-35	Typic Xerocrepts- -loamy-skeletal, mixed,mesic-Beekman	moun-tainous slopes	meta-morphic collu-vium	VGL/VGL	35-85	S. if above 2500 ft	gravel 35-75	20-40	M	slight	well drained	3-6	-droughty -erosion
(719)	1500-3000	20-35	Typic Hapoxeralfs- -fine, mixed, mesic- -Manzanita	alluvial fans and upland slopes	mixed collu-vium	CL/C	30-60	S. if above 2500 ft	gravel 5-35	40+	MS	severe	well drained	6-9	-compaction -erosion

Soils of the Josephine Master Unit and Their Properties and Interpretations (Cont'd)

Map Symbol	Mean Elev. (feet)	Precip. Zone (in.)	Classification Subgroup-Family-Series	Position on Landform	Parent Material	Soil Characteristics: Soil Sub-Soil	Soil Characteristics: Dominant Slope Range Percent	Soil Characteristics: Aspect	Soil Characteristics: Coarse Fragment Kind & Percent	Soil Characteristics: Profile Depth (in.)	Soil Characteristics: Permeability	Soil Qualities and Interrelations: Compaction Hazard	Soil Qualities and Interrelations: Drainage	Soil Qualities and Interrelations: Available Water Holding Capacity (in.)	Soil Qualities and Interrelations: Major Limitation
(721)	1200 - 4000	30-50	Typic Xerochrepts- -coarse-loamy,mixed mesic- -Siskiyou	steep hills & mountains	granitic colluvium	SL / GSL	35-85	varies	gravel 5-35	20-40	M Rapid	slight	somewhat excessively drained	3	-erosion -slumping
(722)	1200-3000	30-50	Ultic Haploxeralfs- -fine-loamy, mixed mesic- -Holland	footslopes & alluvial fans	granitic colluvium	L / CL	3-35	varies	gravel 3-25	40+	MS	Slight -Mod	well	6-9	-erosion -slumping
(770)	1000-5000	25-60	Lithic Xerochrepts- -clayey-skeletal, serpentinitic, mesic- -Pearsoll	mountainous slopes	serpentinitic colluvium	CL / Cbc	10-85	varies	gravel & cobbles 35-75	12-20	Slow	M-severe	well drained	3	-fertility -erosion -sediment -droughty
(781)	1000-4000	20-35	Typic Xerochrepts- -fine-loamy, mixed mesic- -Colestine	mountainous	mixed colluvium	L / CL	35-60	S. if above 2500 ft	gravel 10-35	20-40	M	slight -mod	well drained	3-6	-erosion -slumpage -regeneration
824	3500-6000	40-80	Dystric Xerochrepts- -loamy-skeletal over fragmental, mixed, frigid- -unnamed	mountainous	mixed colluvium	VGL / VGL	5-85	N. if below 4000 ft	gravel 35-75	20-40	M	slight	well drained	3-6	-erosion -slumpage
825	3500-6000	40-80	Dystric Lithic -loamy-skeletal over fragmental, mixed frigid- -unnamed	ridges & side slopes	mixed colluvium	GL / C	5-80	N. if below 4000 ft	gravel 5-35	12-20	M-M rapid	slight	well drained	3	-shallow -erosion -regeneration

Key:
C = Clay
G = Gravelly
L = Loam
V = Very
Si = silt
Cb = cobbly
S = sand

N = North
S = South

M = Moderate
S = Slow

(Source: DeMoulin et al. 1975)

Soil Mapping Units and Acreages for
the Josephine SYU

Map Symbol	Acres BLM	Private	Total
1	4880	20160	25040
R	4620	500	5120
370-382-371/XW	5090	1720	6810
370-382-371/XWN	6850	1080	7930
370-382-371/XY	15270	8520	23790
370-382-371/XYn	29030	11780	40810
371-372-370/XY	55550	29540	85090
371-372-370/XYn	49520	25810	75330
372-371/Y	17860	4630	22490
372-371/Yn	31870	8250	40120
372-R/Y	19410	3900	23310
372-RYn	1460	1190	2650
380/W	5150	5280	10430
380-382/WX	10170	10260	20430
380-382/WXn	10720	7760	18480
381-380/X	12340	8190	20530
381-380/Xn	4240	2800	7040
381-380/XY	9830	6640	6470
381-380/XYn	4770	4590	9360
701-R/Y	2570	1140	3710
712/WX	4210	4400	8610
712/WXn	660	1640	2300
712-718/X	2340	1260	3600
712-718/Xn	1120	970	2090
718-710/XY	8130	2770	10900
718-701/XYn	1330	1790	3120
718-701/Yn	2130	2010	4140
718-719/WX	2740	2270	5010
718-781/XY	11170	8840	20010
718-781/XYn	10430	4240	14670
719/VW	1210	4200	5410
719/W	1890	4480	6370
719/Wn	670	1320	1990
719/WX	2300	4230	6530
719/WXn	2140	0	2140
719-781/WX	2380	1310	3690
719-781/WXn	280	620	900
721/X	4050	2500	6550
721/Xn	1800	940	2740
721/XY	2660	640	3300
721/XYn	3900	3350	7250
721/Y	640	0	640
721/Yn	1940	0	1940
722/V	810	1870	2680
722/VW	2850	850	3700
722/W	500	530	1030
722/Wn	10	130	140
770-R/XY	26110	10760	36870
781-719/WX	1050	640	1690
781-719/XYn	420	110	530
781-719/XYn	2990	3020	6010
824-825/XY	2380	170	2550
824-825/XYn	9460	1970	11430
	425480	243940	669420

(Source: DeMoulin et al. 1975)

The individual soil mapping units are grouped as follows in the general soils map:

General Soils Unit	Component Mapping Units
370-382-371	370-382-371/XW,XWn,XY,XYn
371-372-370	371-372-370/XY,XYn
372-371-R	372-371/Y,Yn;372-R/Y,Yn
381-380	380/W: 380-382/WX,WXn; 381-380/X,Xn,XY,XYn
712-718	712/WX, WXn; 712-718/X,Xn
718-781-719	701-R, 718-701, 718-719, 718-781, 717, 719-781, 781-719
721-722	721/X,Xn,XY,XYn,Y,Yn; 722/V,VW,W,WN; 861XYn
770-R	770-F/XY
824-825	824-825/XY,XYn

These general soils units have the following acreages:

General Soils Unit Acreage (acres and percent of total)

	BLM	Other	Total
Alluvial	4,880 (1.2)	20,160 (8.3)	25,040 (3.8)
Rockland	4,620 (1.1)	500 (0.2)	5,120 (0.8)
370-382-371	56,240 (13.3)	23,100 (9.5)	79,340 (11.9)
371-372-370	105,070 (24.8)	55,350 (22.9)	160,420 (24.1)
372-371-R	70,600 (16.7)	17,970 (7.4)	88,570 (13.3)
381-380	57,220 (13.5)	45,520 (18.8)	102,740 (15.4)
712-718	8,330 (2.0)	8,270 (3.4)	16,600 (2.5)
718-781-719	56,710 (13.4)	46,850 (19.4)	103,560 (15.6)
721-722	22,100 (5.2)	11,370 (4.7)	33,470 (5.0)
770-R	26,110 (6.2)	10,760 (4.4)	36,870 (5.5)
824-825	11,840 (2.8)	2,140 (0.9)	13,980 (2.1)
	423,720	241,990	665,710

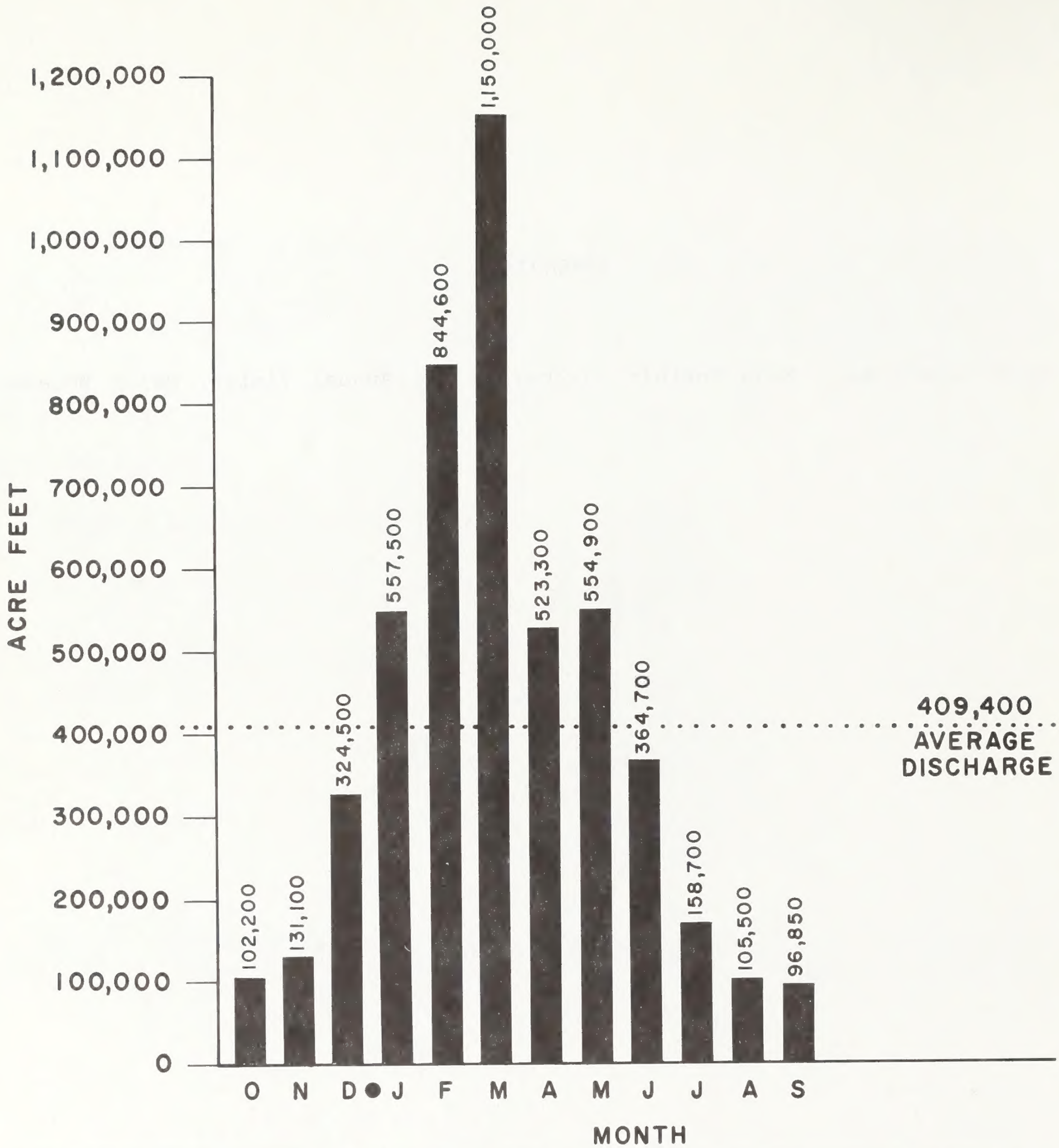
The general soils map units can be grouped as to parent material and location. Soils in each group may have similar properties and behave similarly. As discussed in Section 2.1.1.3, soils from serpentinitic and acid, granitoid rocks cause problems in the timber management program.

Alluvial Soils (in valleys)	Alluvial Land
Siskiyou Mountains	
Soils from Serpentinitic Rocks	770-R*
Soils from Acid, Granitoid Rocks	721-722* 861
Soils from Sedimentary & Metamorphic Rocks	372-371-R 778-781-719 712-718 371-372-370 370-382-371 381-380 824-825

* These soils have been removed from the high intensity lands by the TPCC process. They make up about 11.4 percent of the BLM-administered lands in the JSYU, and 10.6 percent of the entire JSYU.

APPENDIX I

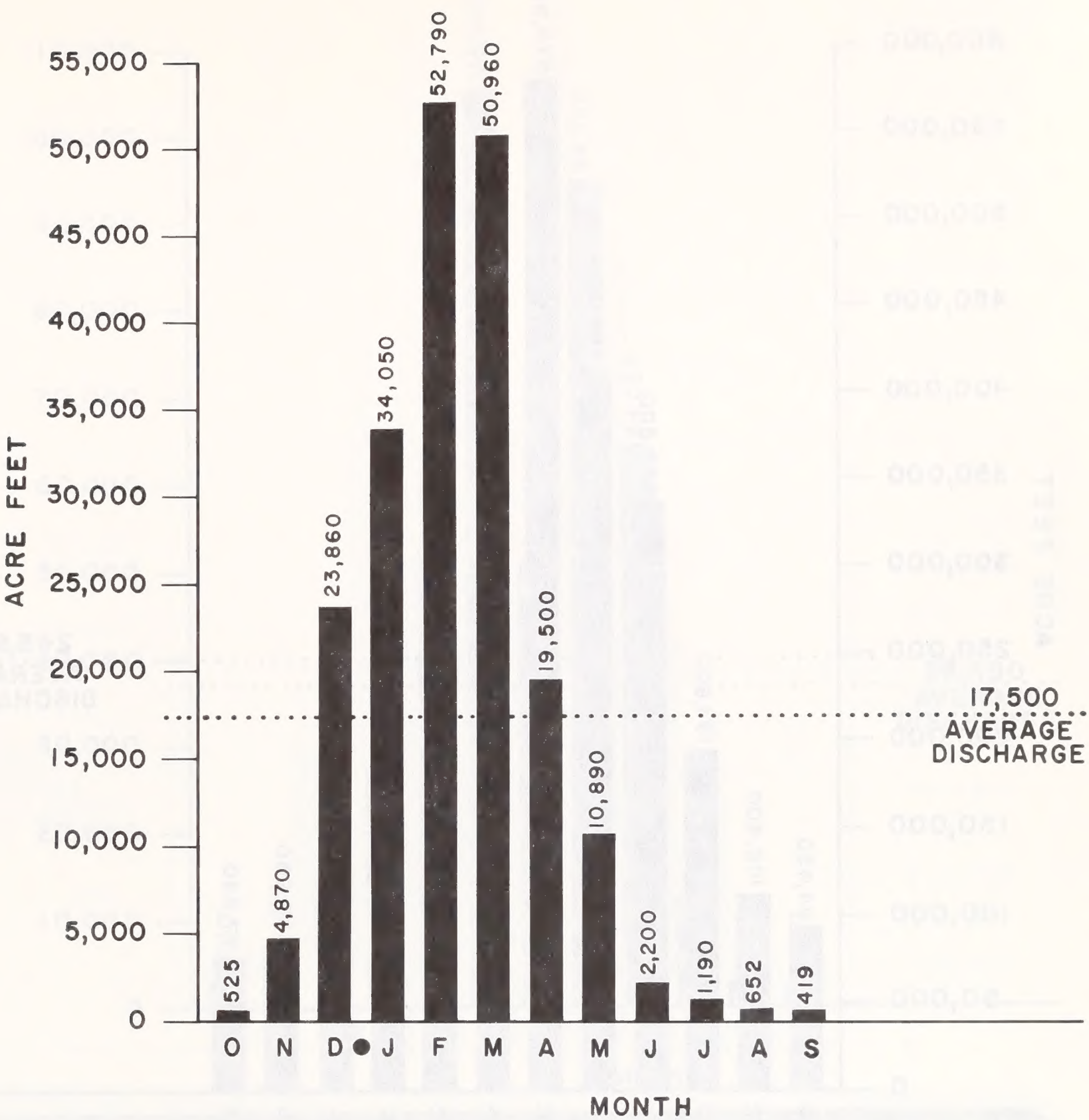
Water Resources: Mean Monthly Discharges and Annual Yields, Major Streams



1-1 MEAN MONTHLY DISCHARGE FOR ROGUE RIVER NEAR AGNESS, OREGON ● WATER YEAR 1975

SOURCE: Water Resources Data for Oregon, Water Year 1975

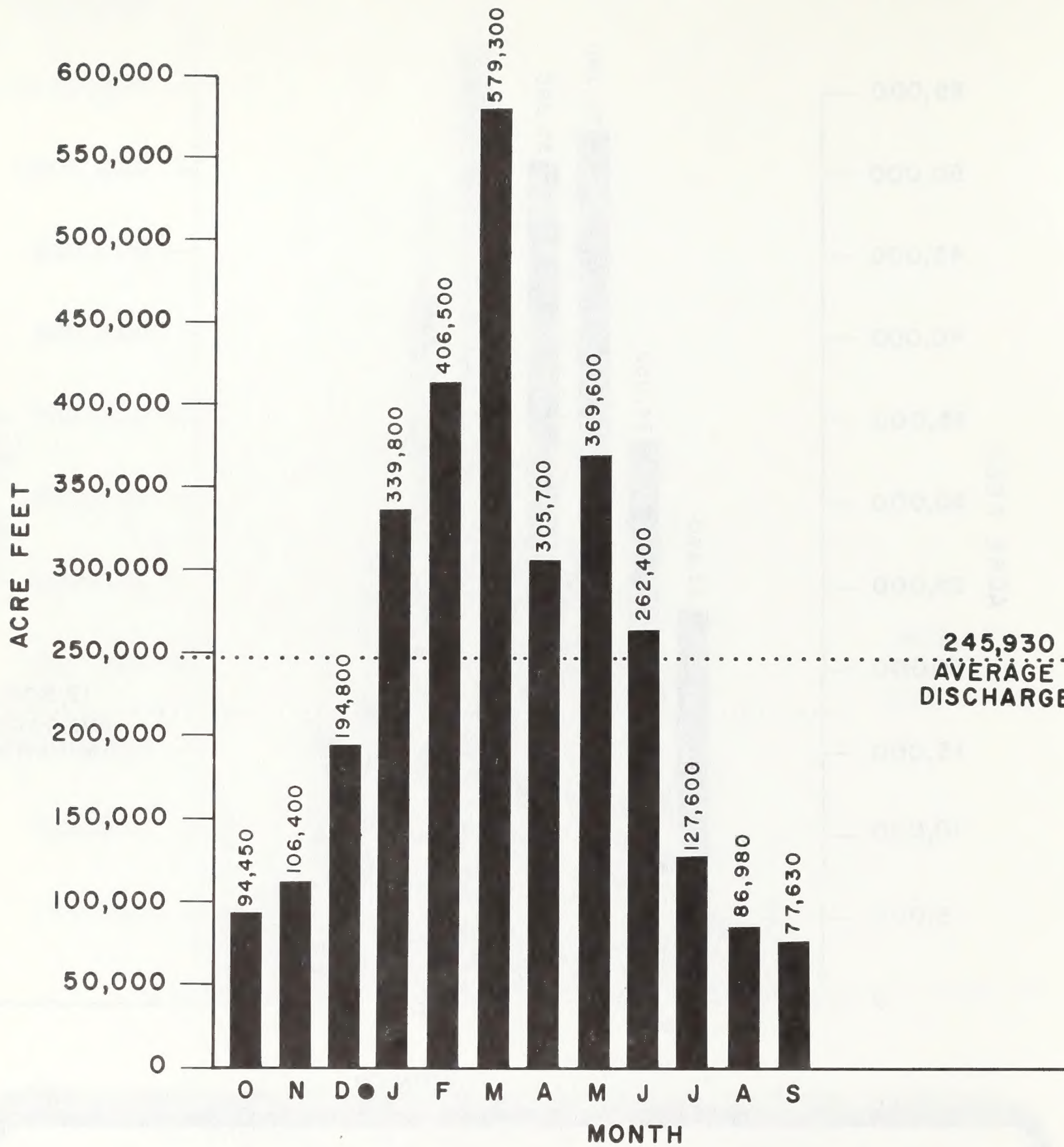
RECORDS:
- Average Annual Discharge (15 years record) — 4,880,000 Ac. Ft.
- Average Discharge, WY 1975 — 4,918,000 Ac. Ft.
- Maximum Daily Discharge Dec. 22, 1964 — 290,000 Ft.^{3}/Sec.
- Minimum Daily Discharge Jul. 9 & 10, 1968 — 608 Ft.^{3}/Sec.
- Average Daily Discharge (15 years record) — 6,792 Ft^3/Sec.



1–2 MEAN MONTHLY DISCHARGE FOR COW CREEK NEAR GLENDALE, OREGON ● WATER YEAR 1975

SOURCE: Water Resources Data for Oregon, Water Year 1975

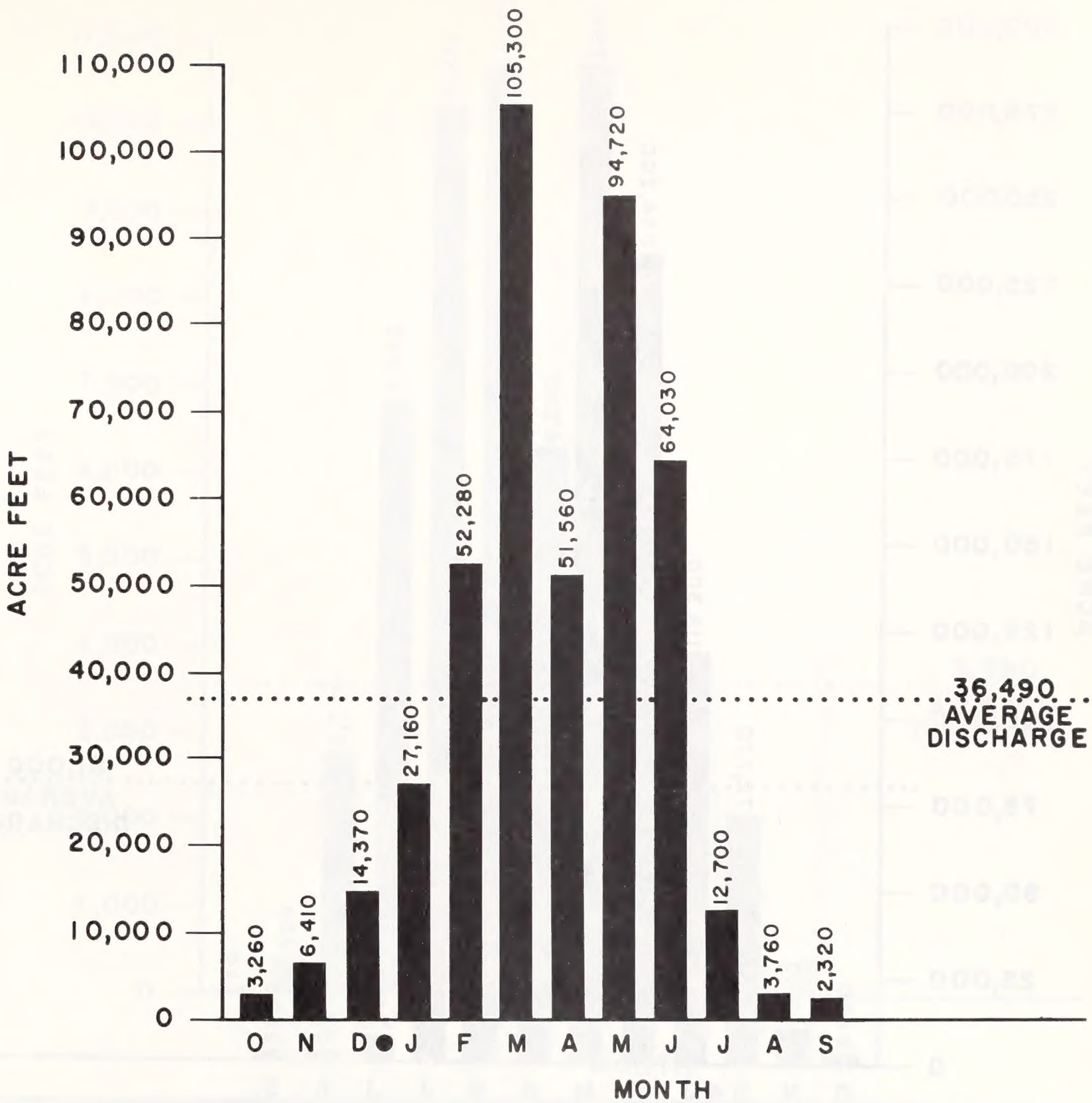
RECORDS:
- ● Average Annual Discharge ———— 210,800 Ac. Ft. (20 years record)
- ● Average Discharge, WY 1975 ———— 201,900 Ac. Ft.
- ● Maximum Daily Discharge ———— 15,700 $Ft.^3/Sec.$ Dec. 22, 1964
- ● Minimum Daily Discharge ———— 5.9 $Ft.^3/Sec.$ Sep. 23 & 24, 1975
- ● Average Daily Discharge ———— 291 $Ft.^3/Sec.$ (20 years record)



I–3 MEAN MONTHLY DISCHARGE FOR ROGUE RIVER AT GRANTS PASS, OREGON ● WATER YEAR 1975

SOURCE: Water Resources Data for Oregon, Water Year 1975

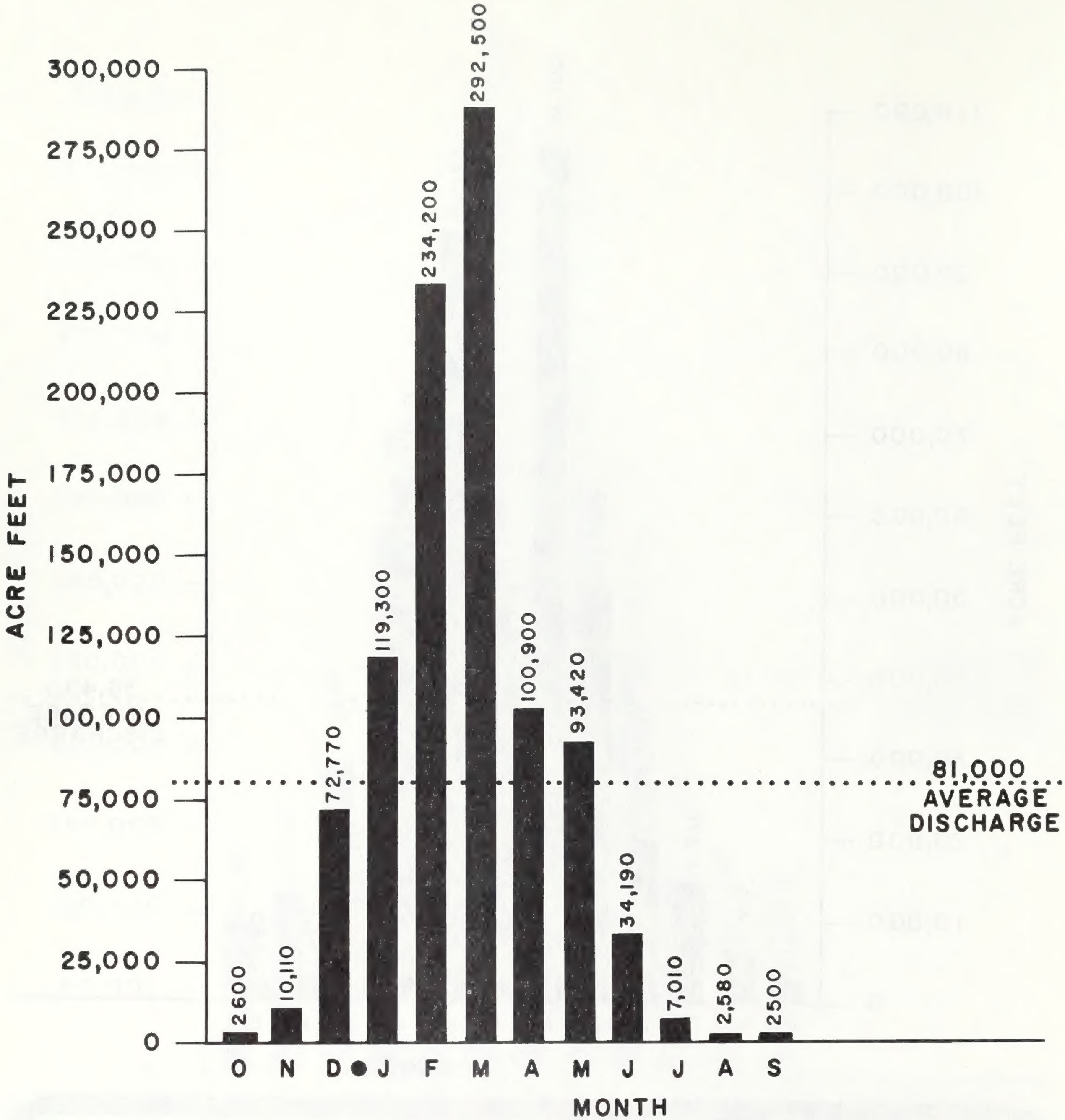
RECORDS:
- Average Annual Discharge — 2,592,000 Ac. Ft. (37 years record)
- Average Discharge, WY 1975 — 2,951,000 Ac. Ft.
- Maximum Daily Discharge — 152,000 Ft.^{3}/Sec. Dec. 23, 1964
- Minimum Daily Discharge — 195 Ft.^{3}/Sec. Jan. 30, 1961
- Average Daily Discharge — 35,780 Ft.^{3}/Sec. (37 years record)



1-4 MEAN MONTHLY DISCHARGE FOR APPLEGATE RIVER NEAR APPLEGATE, OREGON • WATER YEAR 1975

SOURCE: Water Resources Data for Oregon, Water Year 1975

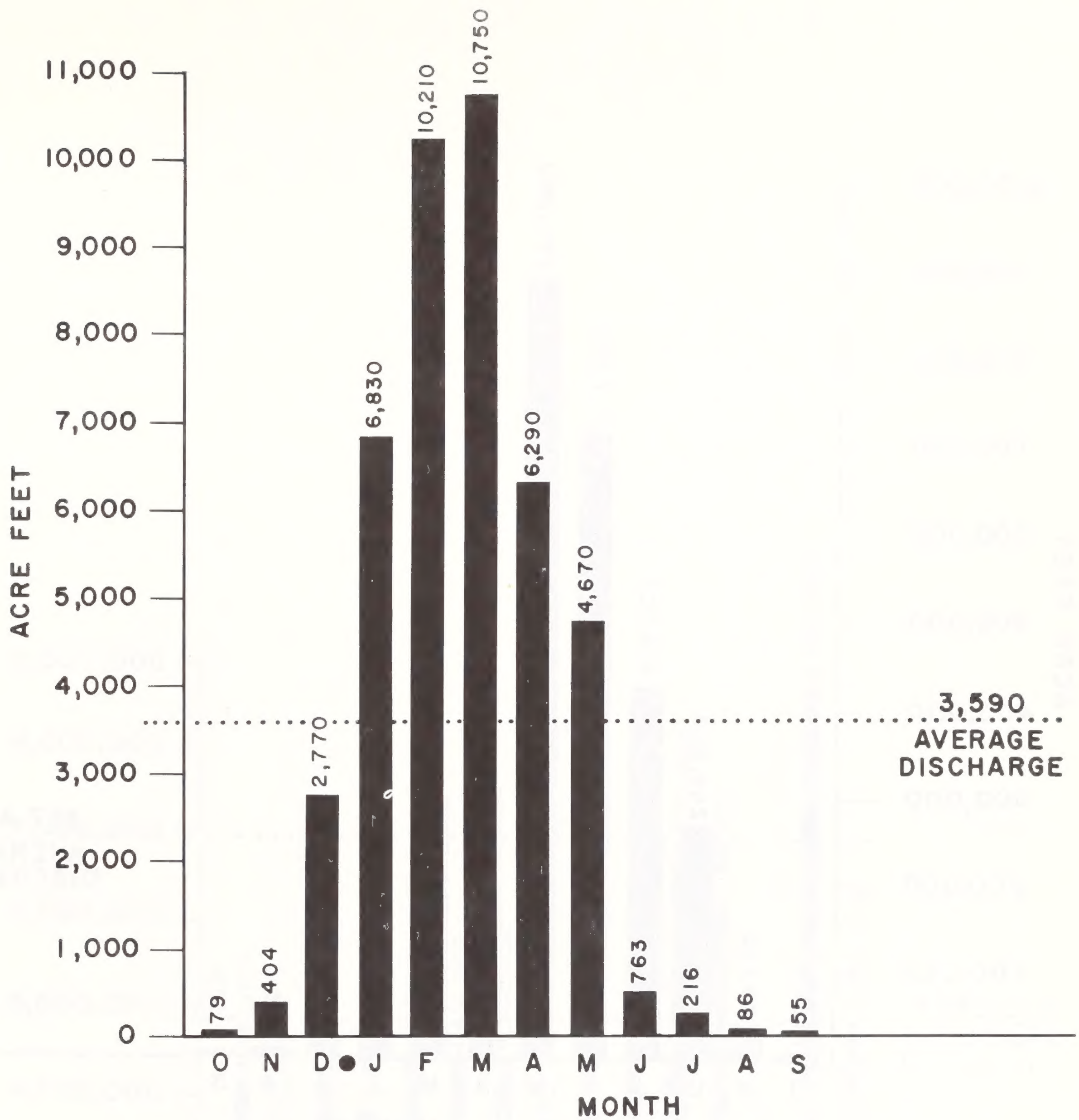
RECORDS:
- Average Annual Discharge —— 413,700 Ac. Ft. (37 years record)
- Average Discharge, WY 1975 —— 437,900 Ac. Ft.
- Maximum Daily Discharge —— 45,700 Ft.^{3}/Sec. Dec. 22, 1964
- Minimum Daily Discharge —— 7 Ft.^{3}/Sec. Sep. 15, 1960
- Average Daily Discharge —— 571 Ft.^{3}/Sec. (37 years record)



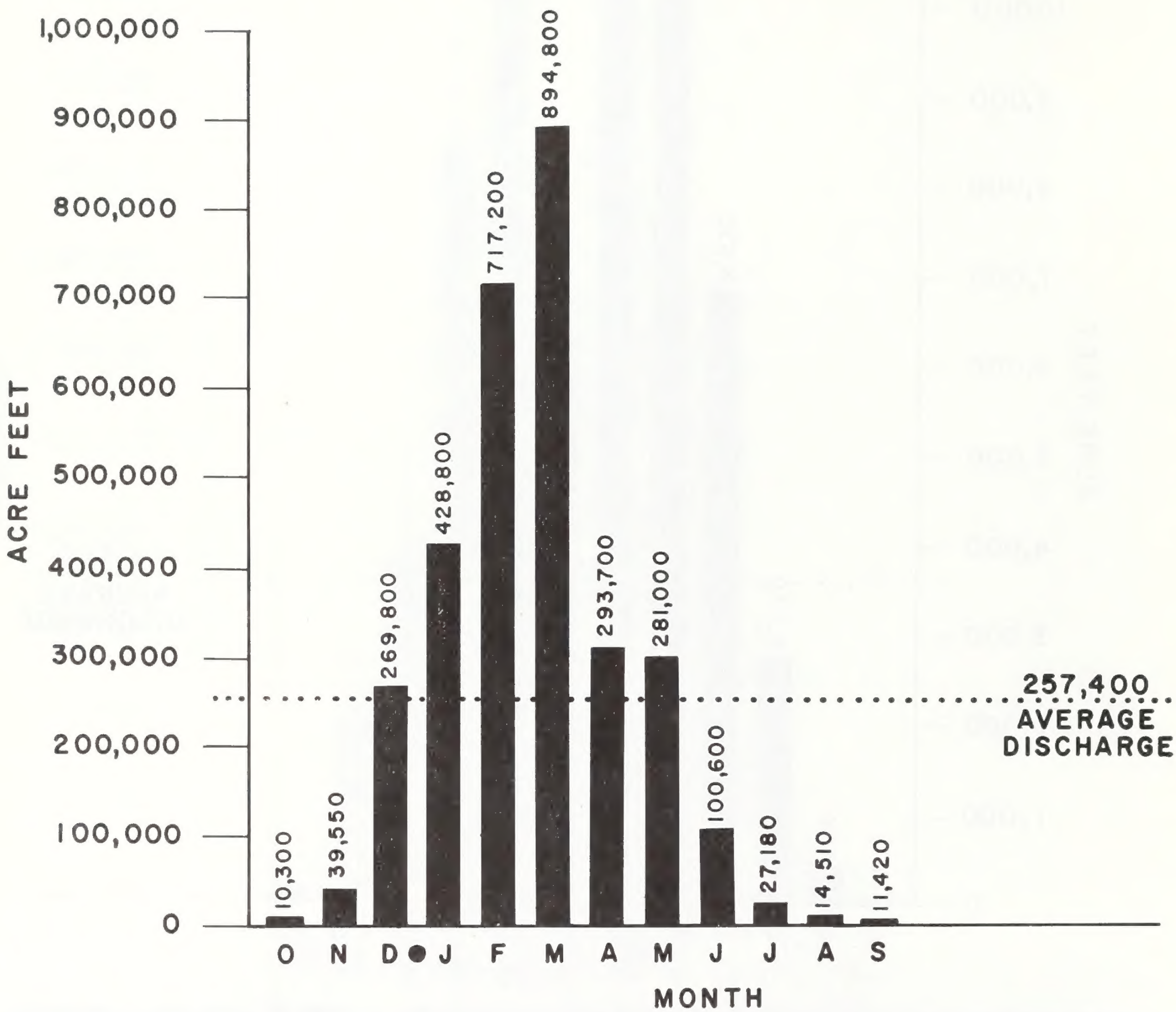
1–5 MEAN MONTHLY DISCHARGE FOR ILLINOIS RIVER NEAR KERBY, OREGON • WATER YEAR 1975

SOURCE: Water Resources Data for Oregon, Water Year 1975

RECORDS:
- Average Annual Discharge —— 1,007,000 Ac. Ft. (14 years record)
- Average Discharge, WY 1975 —— 972,200 Ac. Ft.
- Maximum Daily Discharge —— 30,000 Ft.^{3}/Sec. Dec. 22, 1964
- Minimum Daily Discharge —— 18 Ft.^{3}/Sec. Aug. 23, 1973
- Average Daily Discharge —— 1,390 Ft.^{3}/Sec. (14 years record)



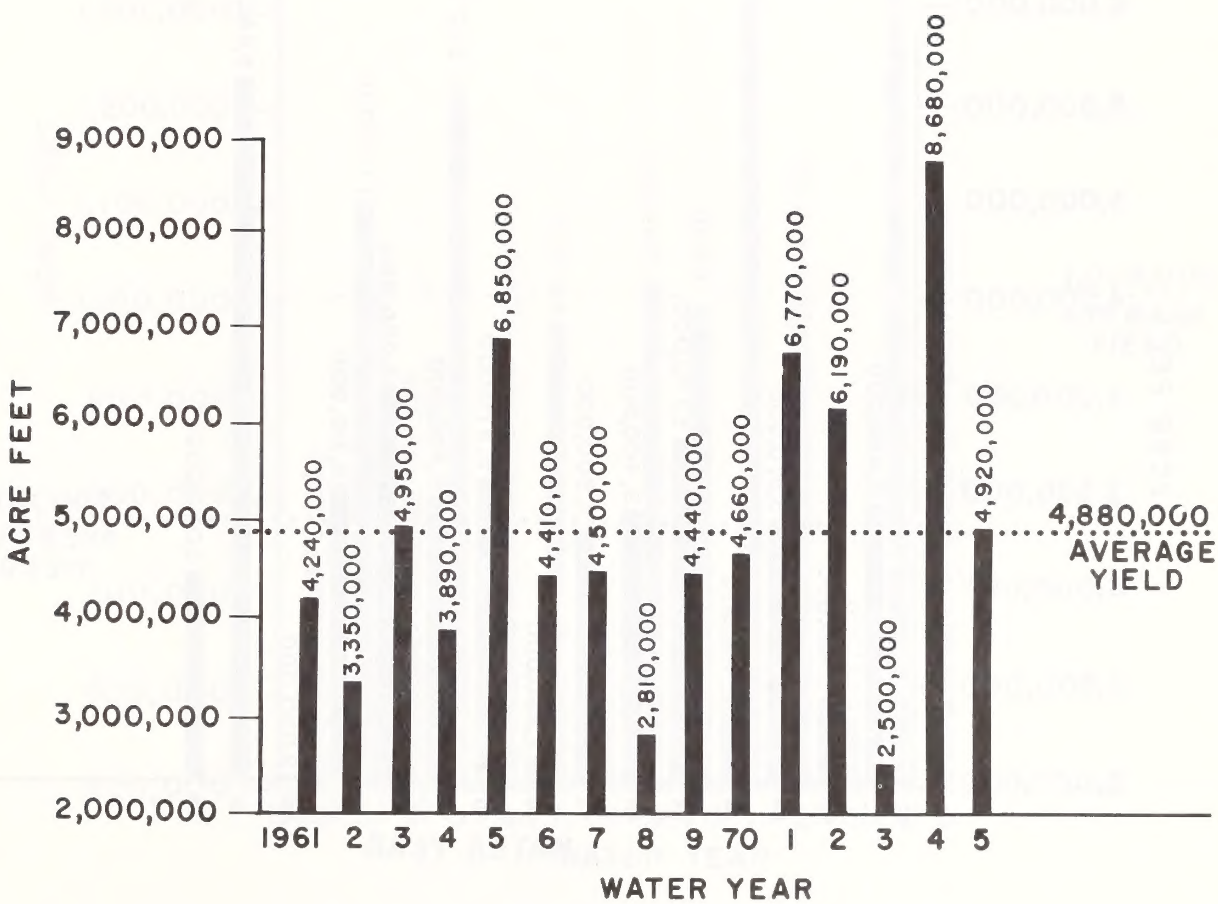
1–6	**MEAN MONTHLY DISCHARGE FOR GRAVE CREEK AT PEASE BRIDGE NEAR PLACER, OREGON • WATER YEAR 1975**		
	SOURCE: Water Resources Data for Oregon, Water Year 1975		
	RECORDS: • Average Annual Discharge (30 years record)	44,630	Ac. Ft.
	• Average Discharge, WY 1975	43,120	Ac. Ft.
	• Maximum Daily Discharge Dec. 22, 1964	6,240	$Ft.^3/Sec.$
	• Minimum Daily Discharge Jul. 15, 1970	0.12	$Ft.^3/Sec.$
	• Average Daily Discharge (30 years record)	61.6	$Ft.^3/Sec.$



1–7 MEAN MONTHLY DISCHARGE FOR ILLINOIS RIVER NEAR AGNESS, OREGON • WATER YEAR 1975

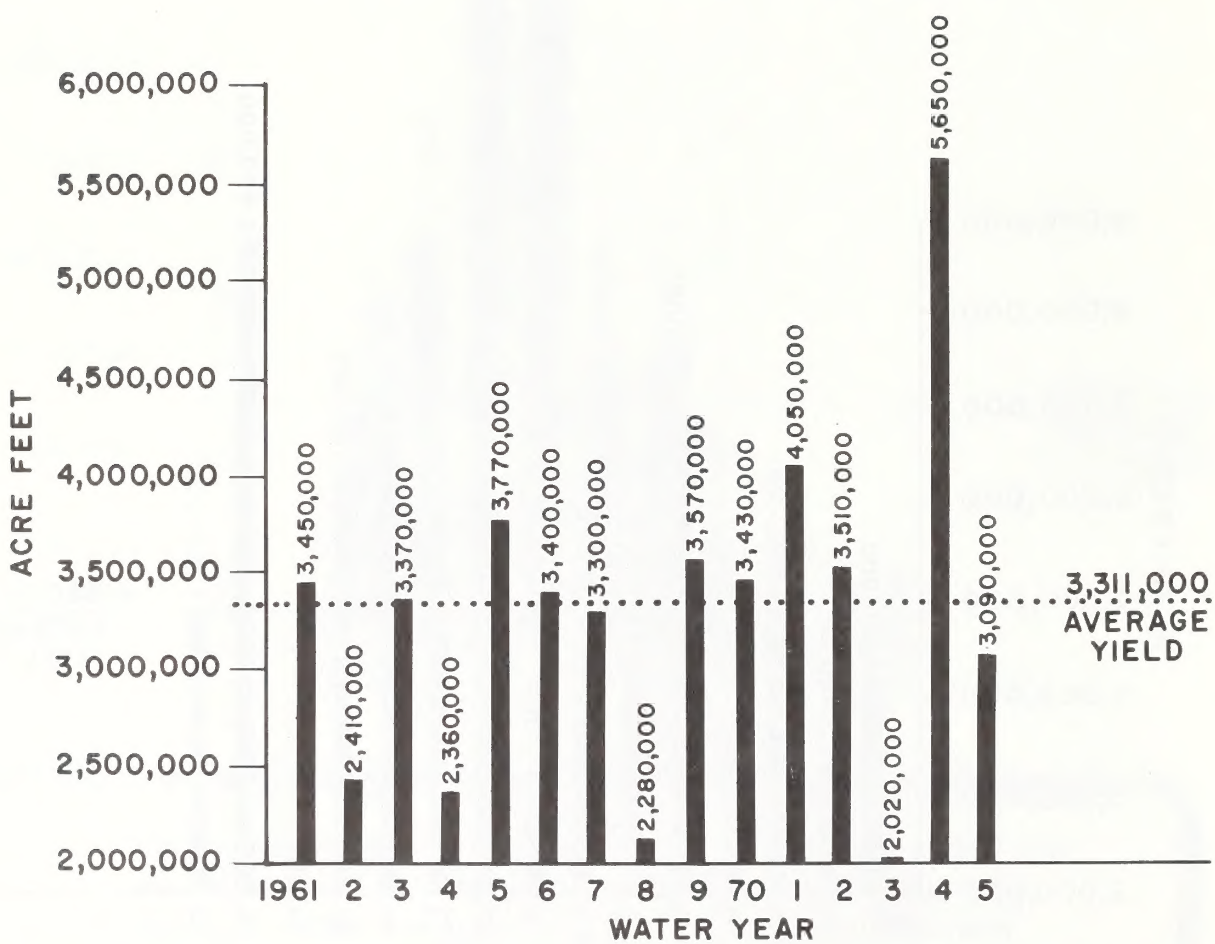
SOURCE: Water Resources Data for Oregon, Water Year 1975

RECORDS:
- Average Annual Discharge (15 years record) — 3,311,000 Ac. Ft.
- Average Discharge, WY 1975 — 3,089,000 Ac. Ft.
- Maximum Daily Discharge Dec. 22, 1964 — 225,000 Ft.^{3}/Sec.
- Minimum Daily Discharge Sep. 10, 11, & 17, 1972 and Sep. 16 & 17, 1973 — 130 Ft.^{3}/Sec.
- Average Daily Discharge (15 years record) — 4,570 Ft.^{3}/Sec.



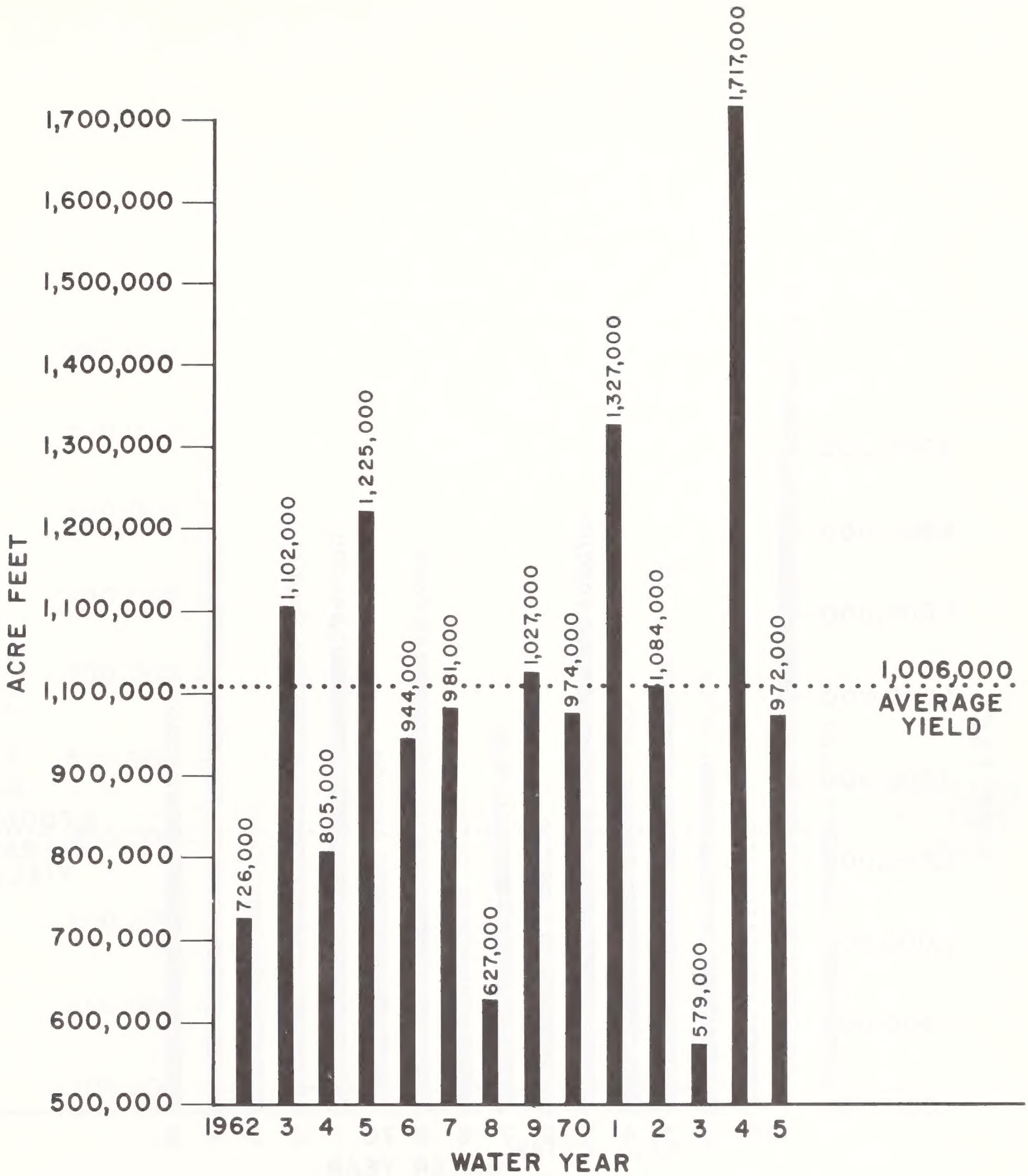
1-8 ANNUAL YIELD FOR ROGUE RIVER AT AGNESS, OREGON 1961•1975

SOURCE: USGS File Data



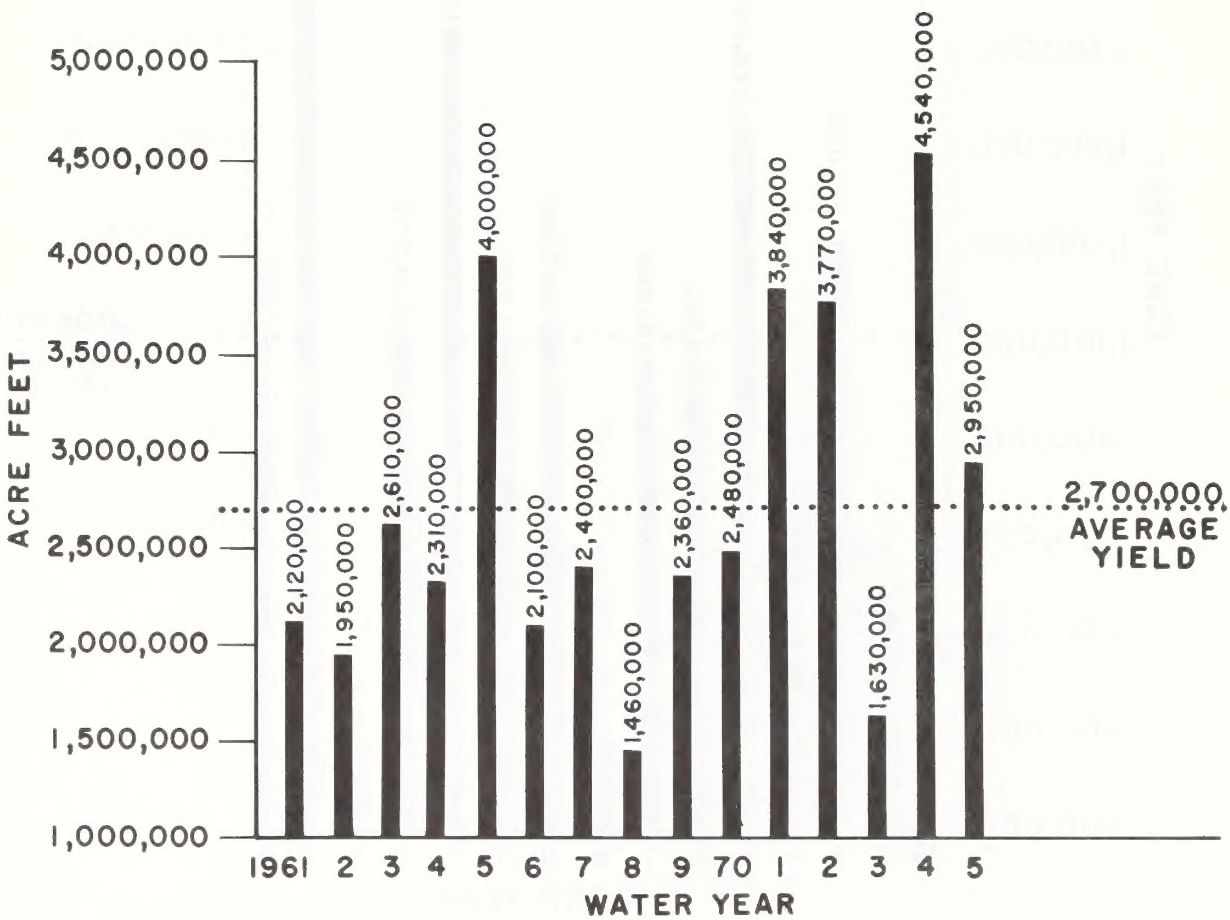
1-9 ANNUAL YIELD FOR ILLINOIS RIVER NEAR AGNESS, OREGON 1961 • 1975

SOURCE: USGS File Data



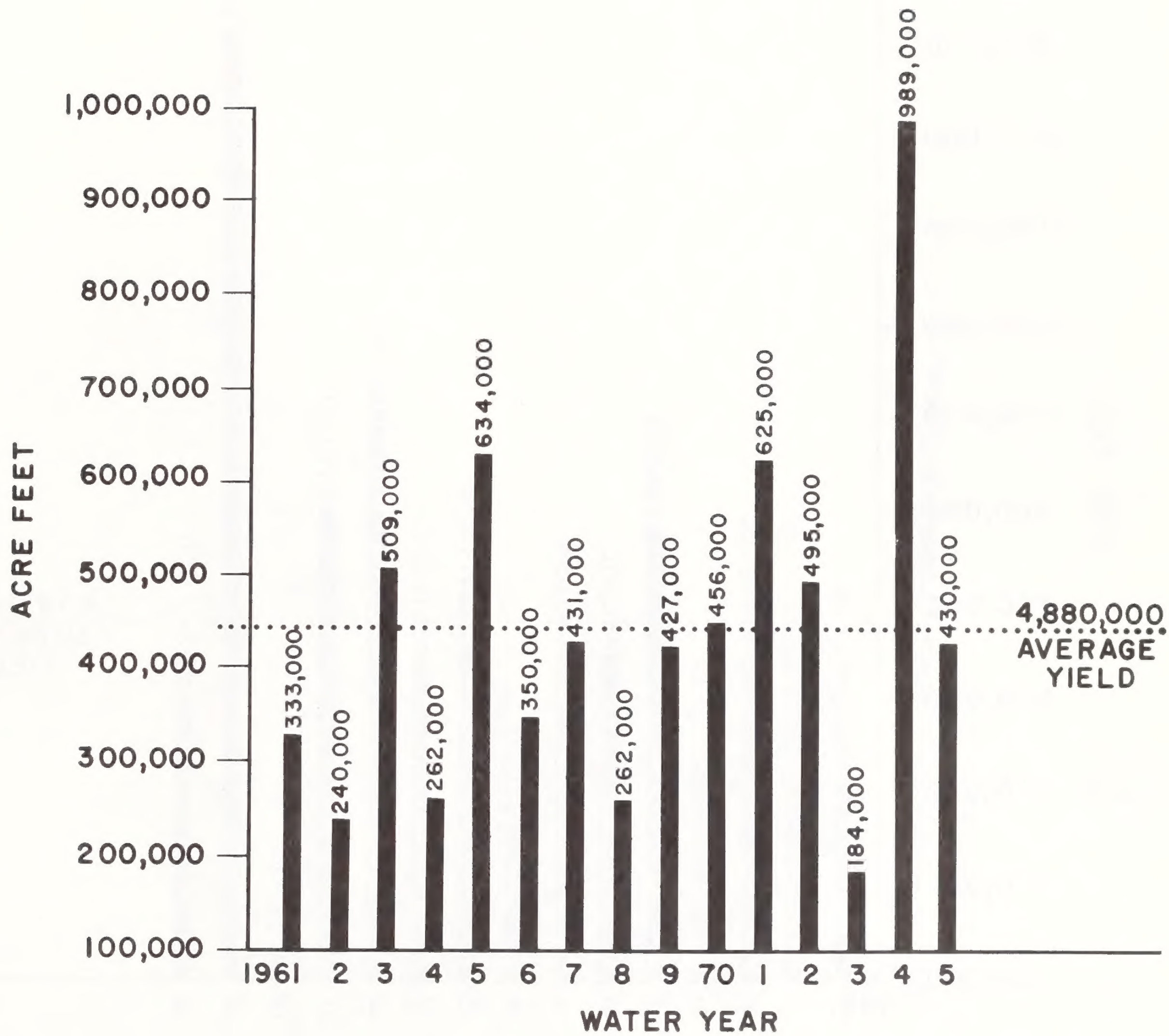
1-10 ANNUAL YIELD FOR ILLINOIS RIVER AT KERBY, OREGON 1962•1975

SOURCE: USGS File Data



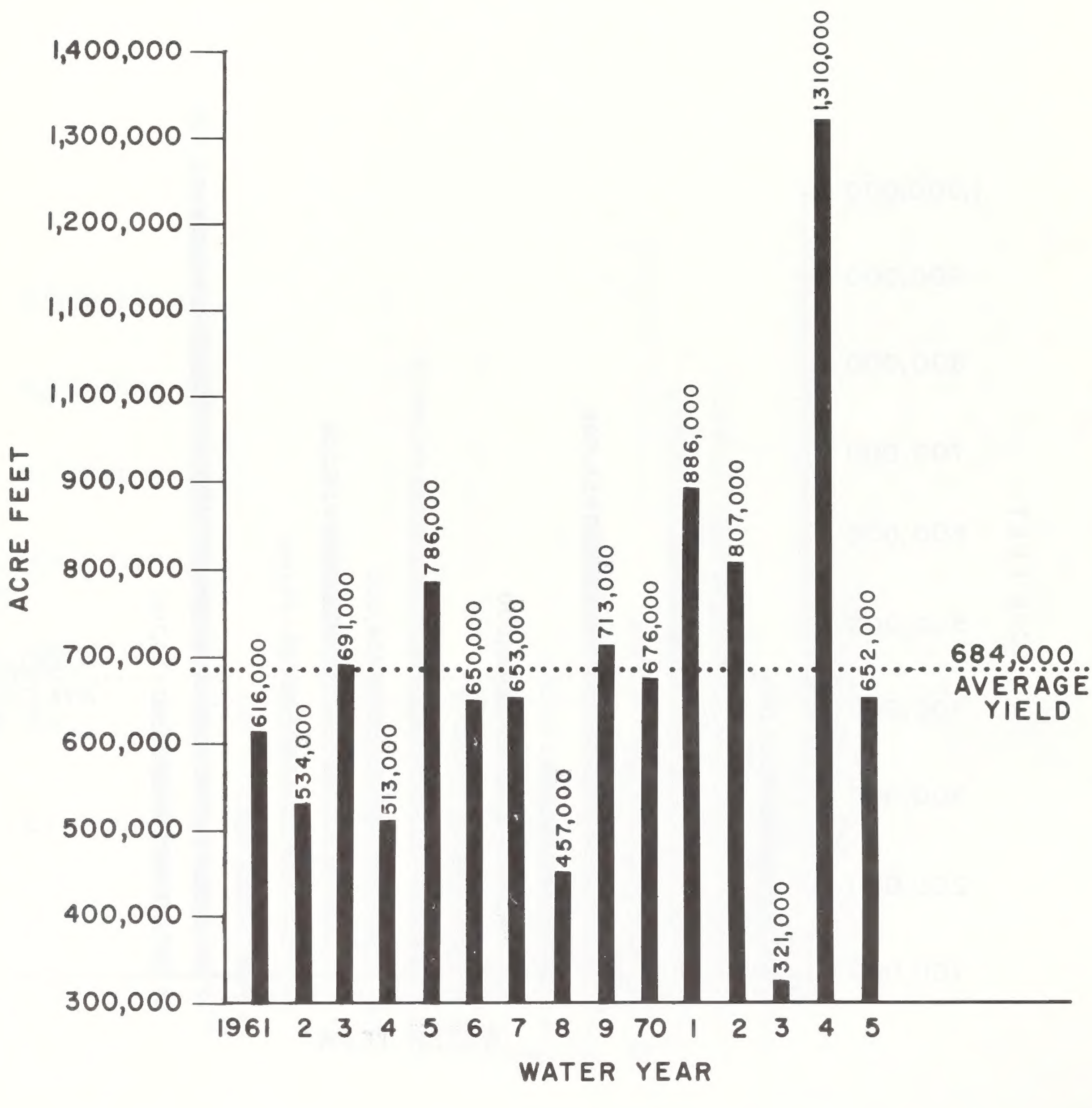
I-II ANNUAL YIELD FOR ROGUE RIVER NEAR GRANTS PASS OREGON

SOURCE: USGS File Data



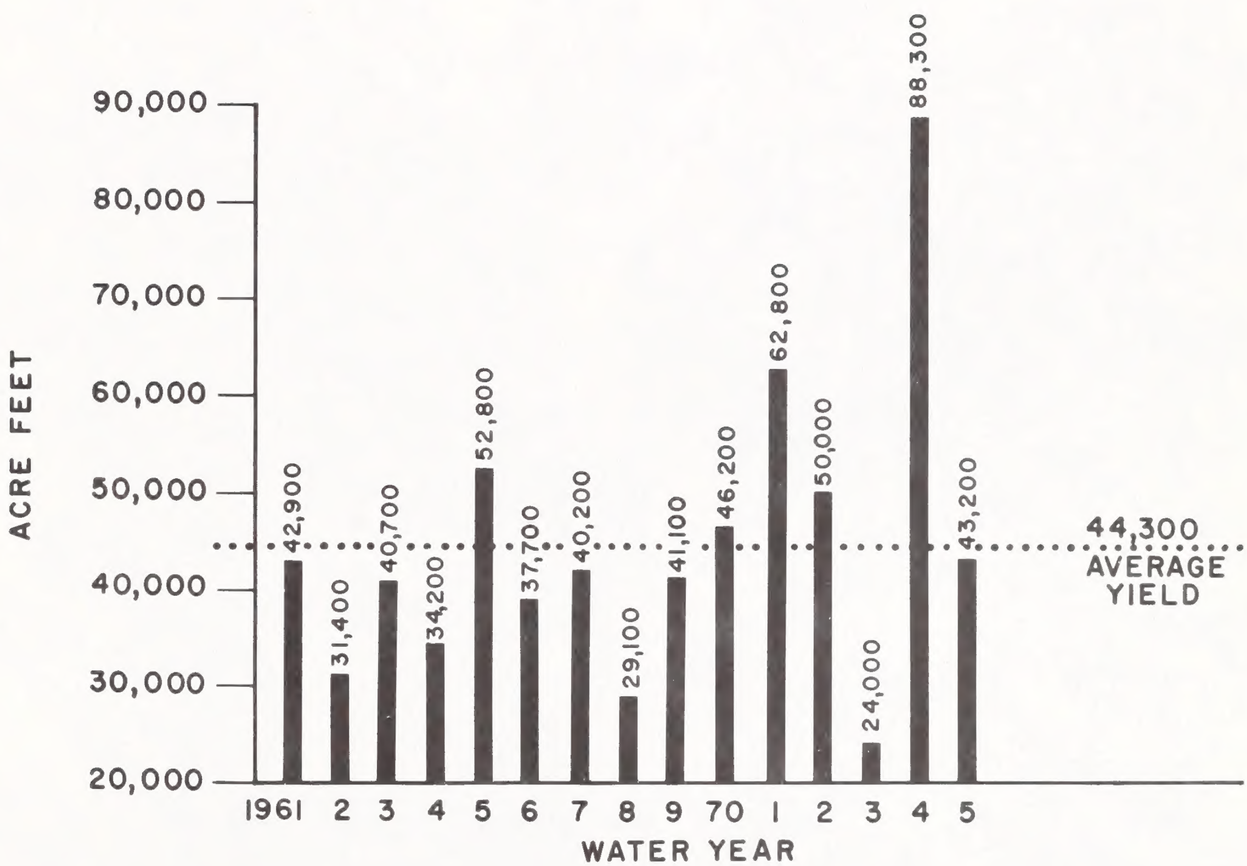
1–12 ANNUAL YIELD FOR APPLEGATE RIVER NEAR APPLEGATE, OREGON 1961•1975

SOURCE: USGS File Data



1-13 ANNUAL YIELD FOR COW CREEK AT RIDDLE, OREGON 1961 • 1975

SOURCE: USGS File Data



I-14 ANNUAL YIELD FOR GRAVE CREEK NEAR PLACER, OREGON 1961 ● 1975

SOURCE: USGS File Data

APPENDIX J

PRESENT WATER QUALITY STANDARDS (EXCERPTS)

OREGON ADMINISTRATIVE RULES

CHAPTER 340

41-025 GENERAL WATER QUALITY STANDARDS. The following General Water Quality Standards shall apply to all waters of the state except where they are clearly superseded by Special Water Quality standards applicable to specifically designated waters of the state. No wastes shall be discharged and no activities shall be conducted which either alone or in combination with other wastes or activities will cause in any waters of the state:

(1) The dissolved oxygen content of surface waters to be less than six (6) milligrams per liter unless specified otherwise by special standard.

(2) The hydrogen-ion concentration (pH) of the waters to be outside the range of 6.5 to 8.5 unless specified otherwise by special standard.

(3) The liberation of dissolved gases, such as carbon-dioxide, hydrogen sulfide or any other gases, in sufficient quantities to cause objectionable odors or to be deleterious to fish or other aquatic life, navigation, recreation, or other reasonable uses made of such waters.

(4) The development of fungi or other growths having a deleterious effect on stream bottoms, fish or other aquatic life, or which are injurious to health, recreation or industry.

(5) The creation of tastes or odors or toxic or other conditions that are deleterious to fish or other aquatic life or affect the potability of drinking water or the palatability of fish or shellfish.

(6) The formation of appreciable bottom or sludge deposits or the formation of any organic or inorganic deposits deleterious to fish or other aquatic life or injurious to public health, recreation or industry.

(7) Objectionable discoloration, turbidity, scum, oily sleek or floating solids, or coat the aquatic life with oil films.

(8) Bacterial pollution or other conditions deleterious to waters used for domestic purposes, livestock watering, irrigation, bathing, or shellfish propagation, or be otherwise injurious to public health.

(9) Any measurable increase in temperature when the receiving water temperatures are 64° F. or greater; or more than 0.5° F. increase due to a single-source discharge when receiving water temperatures are 63.5° F. or less, or more than 2° F. increase due to all sources combined when receiving water temperatures are 62° F. or less.

(10) Aesthetic conditions offensive to the human senses of sight, taste, smell or touch.

(11) Radioisotope concentrations to exceed Maximum Permissible Concentrations (MPC's) in drinking water, edible fishes or shellfishes, wildlife, irrigated crops, livestock and dairy products or pose an external radiation hazard.

(12) The concentration of total dissolved gas relative to atmospheric pressure at the point of sample collection to exceed one hundred and five percent (105%) of saturation, except when stream flow exceeds the 10-year, 7-day average flood.

41-080 SPECIAL WATER QUALITY AND WASTE TREATMENT STANDARDS FOR THE ROGUE RIVER BASIN.

(1) Special Water Quality Standards. The provisions of this sub-section shall be in addition to an not in lieu of the General Water Quality Standards contained in Section 41-025, except where this subsection imposes a conflicting requirement with the provisions of Section 41-025, this sub-section shall govern. No wastes shall be discharged and no activities shall be conducted which either alone or in conjunction with other wastes or activities will cause in the waters of the Rogue River Basin:

(a) Organisms of the Coliform Group where associated with fecal sources (MPN or equivalent MF using a representative number of samples).

(A) Mainstem Rogue River from the point of salt water intrusion, approximately R.N. 4, upstream to Dodge Park, river mile 138.4, and Bear Creek; average concentrations to exceed 1000 per 100 milliliters, except during periods of high surface runoff.

(B) Rogue River above Dodge Park and all unspecified tributaries, average concentrations to exceed 240 per 100 milliliters, except during periods of high surface runoff.

(b) Dissolved Oxygen (D.O.). Dissolved oxygen concentrations to be less than 90 percent of saturation at seasonal low, or less than 95 percent of saturation in spawning areas during spawning, incubation, hatching, and fry stages of salmonid fishes.

(c) pH (Hydrogen Ion Concentration). pH values to fall outside the range of 7.0 to 8.5.

(d) Turbidity. (Jackson Turbidity Units, JTU). Any measurable increases in natural stream turbidities when natural turbudities are less than 30 JTU, or more than a 10 percent cumulative increase in natural stream turbidities when stream turbidities are more than 30 JTU, except for certain short-term activities which may be specifically authorized by the Department of Environmental Quality under such conditions as it may prescribe and which are necessary to accommodate essential dredging, construction, or other legitimate uses or activities where turbidities in excess of this standard are unavoidable.

(e) Temperature. Any measurable increase when stream temperatures are 58° F. or greater; or more than 0.5° F. increase due to a single-source discharge when receiving water temperatures are 57.5° F or less or more than 2° F. increase due to all sources combined with stream temperatures are 56° F. or less, except for short-term activities which may be specifically authorized by the Department of Environmental Quality upon such conditions as it may prescribe and which are necessary to accommodate legitimate uses or activities where temperatures in excess of this standard are unavoidable.

(f) Dissolved Chemical Substances. Guide concentrations listed below to be exceeded except as may be specifically authorized by the Department of Environmental Quality upon such conditions as it may deem necessary to carry out the general intent of Section 41-010 and to protect the beneficial uses set forth in Table 11.

	mg/ℓ
Arsenic (As)	0.01
Barium (Ba)	1.0
Boron (Bo)	0.5
Cadmium (Cd)	0.003
Chloride (Cl)	25.0
Chromium (Cr)	0.02
Copper (Cu)	0.005
Cyanide (Cn)	0.005
Fluoride (F)	1.0
Iron (Fe)	0.1
Lead (Pb)	0.05
Manganese (Mn)	0.05
Phenols (totals)	0.001
Total dissolved solids	100.0
Zinc (Zn)	0.01

(2) Minimum standards for treatment and control of wastes. All wastes shall be treated, prior to discharge, in accordance with the following:

(a) Sewage Wastes.

(A) During the period of low stream flows (approximately June 1 - October 31 of each year), secondary treatment resulting in monthly average effluent concentrations not to exceed 20 mg/ℓ of 5-day 20° C. Biochemical Oxygen Demand (BOD) and 20 mg/ℓ of suspended solids or equivalent control.

(B) During the period of high stream flows (approximately November 1 - May 31 of each year) a minimum of secondary treatment or equivalent shall be provided and all waste treatment and control facilities shall be operated at maximum efficiency so as to minimize waste discharges to public waters.

(C) All sewage wastes shall be disinfected, after treatment, equivalent to thorough mixing with sufficient chlorine to provide a residual of at least 1 part per million after 60 minutes of contact time.

(D) More stringent waste treatment requirements may be imposed, especially in headwater and tributary streams, where waste loads may be large relative to stream flows.

(b) Industrial Wastes.

(A) Industrial waste treatment requirements shall be determined on an individual basis in accordance with the provisions of Sections 41-010, 41-015, 41-020, 41-025, and 41-030.

(B) Where industrial effluents contain significant quantities of potentially toxic elements, treatment requirements shall be determined utilizing appropriate bio-assays.

41-085 SPECIAL WATER QUALITY AND WASTE TREATMENT STANDARDS FOR THE UMPQUA RIVER BASIN

(1) Special Water Quality Standards. The provisions of this sub-section shall be in addition to and not in lieu of the General Water Quality Standards contained in Section 41-025, except where this subsection imposes a conflicting requirement with the provisions of Section 41-025, this sub-section shall govern. No wastes shall be discharged and no activities shall be conducted which either alone or in conjunction with other wastes or activities shall cause in the waters of the Umpqua River Basin:

(a) Organisms of the Coliform Group where associated with fecal sources. (MPN or equivalent MF using a representative number of samples.)

(A) Mainstem Umpqua River from tidewater to South Umpqua River from mouth to near Canyonville (river mile 53), and Cow Creek from mouth to Glendale (river mile 42), average concentrations of coliform bacteria to exceed 1000 per 100 milliliters, except during periods of high surface runoff.

(B) North Umpqua River and all other unspecified stream sections and tributaries in the basin, average concentrations of coliform bacteria to exceed 240 per 100 milliliters, except during periods of high surface runoff.

(b) Dissolved Oxygen (D.O.). Dissolved oxygen concentrations to be less than 90 percent of saturation at the seasonal low, or less than 95 percent of saturation in spawning areas during spawning, incubation, hatching, and fry stages of salmonid fishes.

(c) pH (Hydrogen Ion Concentration). pH values to fall outside the range of 7.0 to 8.5.

(d) Turbidity (Jackson Turbidity Units, JTU). Any measurable increases in natural stream turbidities when natural turbidities are less than 30 JTU, or more than a 10 percent cumulative increase in natural stream turbidities when stream turbidities are more than 30 JTU, except for certain short-term activities which may be specifically authorized by the Department of Environmental Quality under such conditions as it may prescribe and which are necessary to accommodate essential dredging, construction, or other legitimate uses or activities where turbidities in excess of this standard are unavoidable.

(e) Temperature. Any measurable increases when stream temperatures are 58° F. or greater; or more than 0.5° F. increase due to a single-source discharge when receiving water temperatures are 57.5° F. or less; or more than 2° F. increase due to all sources combined when stream temperatures are

56° F. or less, except for certain short-term activities which may be specifically authorized by the Department of Environmental Quality under such conditions as it may prescribe and which are necessary to accommodate legitimate uses or activities where temperatures in excess of this standard are unavoidable.

(f) Dissolved Chemical Substances. Guide concentrations listed below to be exceeded except as may be specifically authorized by the Department of Environmental Quality upon such conditions as it may deem necessary to carry out the general intent of Section 41-010 and to protect the beneficial uses set forth in Table

	mg/ℓ
Arsenic (As)	0.01
Barium (Ba)	1.0
Boron (Bo)	0.5
Cadmium (Cd)	0.003
Chloride (Cl)	25.0
Chromium (Cr)	0.02
Copper (Cu)	0.005
Cyanide (Cn)	0.005
Fluoride (F)	1.0
Iron (Fe)	0.1
Lead (Pb)	0.05
Manganese (Mn)	0.05
Phenols (totals)	0.001
Total dissolved solids	100.0
Zinc (Zn)	0.01

(2) Minimum Standards for Treatment and Control of Wastes. All wastes shall be treated, prior to discharge, in accordance with the following:

(a) Sewage Wastes.

(A) During the period of low stream flows (approximately June 1 - October 31 of each year), secondary treatment resulting in monthly average effluent concentrations not to exceed 20 mg/ℓ of 5-day 20° C. Biochemical Oxygen Demand (BOC) and 20 mg/ℓ of suspended solids or equivalent control.

(B) During the period of high stream flows (approximately November 1 - May 31 of each year) a minimum of secondary treatment or equivalent shall be provided and all waste treatment and control facilities shall be operated at maximum efficiency so as to minimize waste discharges to public waters.

(C) All sewage wastes shall be disinfected, after treatment, equivalent to thorough mixing with sufficient chlorine to provide a residual of at least 1 part per million after 60 minutes of contact time.

(D) More stringent waste treatment requirements may be imposed, especially in headwaters and tributary streams, where waste loads may be large relative to stream flows.

(b) Industrial Wastes.

(A) Industrial waste treatment requirements shall be determined on an individual basis in accordance with the provisions of Sections 41-010, 41-015, 41-020, 41-025, and 41-030.

(B) Where industrial effluents contain significant quantities of potentially toxic elements, treatment requirements shall be determined utilizing appropriate bio-assays.

APPENDIX K

EMPLOYMENT IMPACTS IN THE MEDFORD TIMBERSHED ASSOCIATED WITH BUREAU OF LAND MANAGEMENT HARVESTING ALTERNATIVES IN THE JOSEPHINE SUSTAINED-YIELD UNIT

by

Brian R. Wall
Economist
1977

Pacific Northwest Forest and Range Experiment Station
Forest Service
Portland, Oregon

Introduction

At the request of the Bureau of Land Management (BLM) the Pacific Northwest Forest and Range Experiment Station did a special study on forest industry employment in the Medford Timbershed of western Oregon. The BLM wanted to measure the direct employment impacts in the Medford Timbershed related to their various harvesting alternatives in the Josephine Sustained-Yield Unit. This report presents the findings of this study.

Timber Output

The first requirement in this study is that the basic assumptions and projections of timber output must be established. A model of the timber output for each ownership in the Medford Timbershed must be available. For this project, projection A-1 was selected from "Timber for Oregon's Tomorrow," (Beuter, et al., 1976). This run has a low level of management intensification. Run A-1 answers two questions: (1) Can the present annual harvest (based on the annual average of 1968-1973) be maintained to the year 2000 if public owners maintain their allowable cuts and private owners continue trying to fill the gap between public harvest and total harvest? (2) What is the capability for timber harvest after the year 2000 if policies and actions among owner classes in question (1) above are continued until the year 2000?

The average timber harvest in the Medford Timbershed for the 1968-73 period amounted to 603 million board feet. Under A-1 the harvest is projected to dècline to 494 million board feet (down 18 percent) by the year 2000. After the year 2000, the harvest rises to the 603 million board-foot level in 2010, then declines to 53 million board feet in 2020 and drops slightly to 592 million board feet in the year 2030. The decline in the output is caused by decline on forest industry lands. The Bureau of Land Management cut remains fairly constant throughout the projection period. This run has been used in this analysis as the No-Action Alternative for the BLM in the Josephine Sustained-Yield Unit. No reductions are made from the present allowable cut under this alternative. For other alternatives the reductions in BLM allowable cut in the Josephine and Jackson County portions of the JSYU are subtracted from Run A-1 to determine the new timber output levels. This assumes no timber harvest substitution from other sources occurs when BLM cut changes.

Employment Calculations

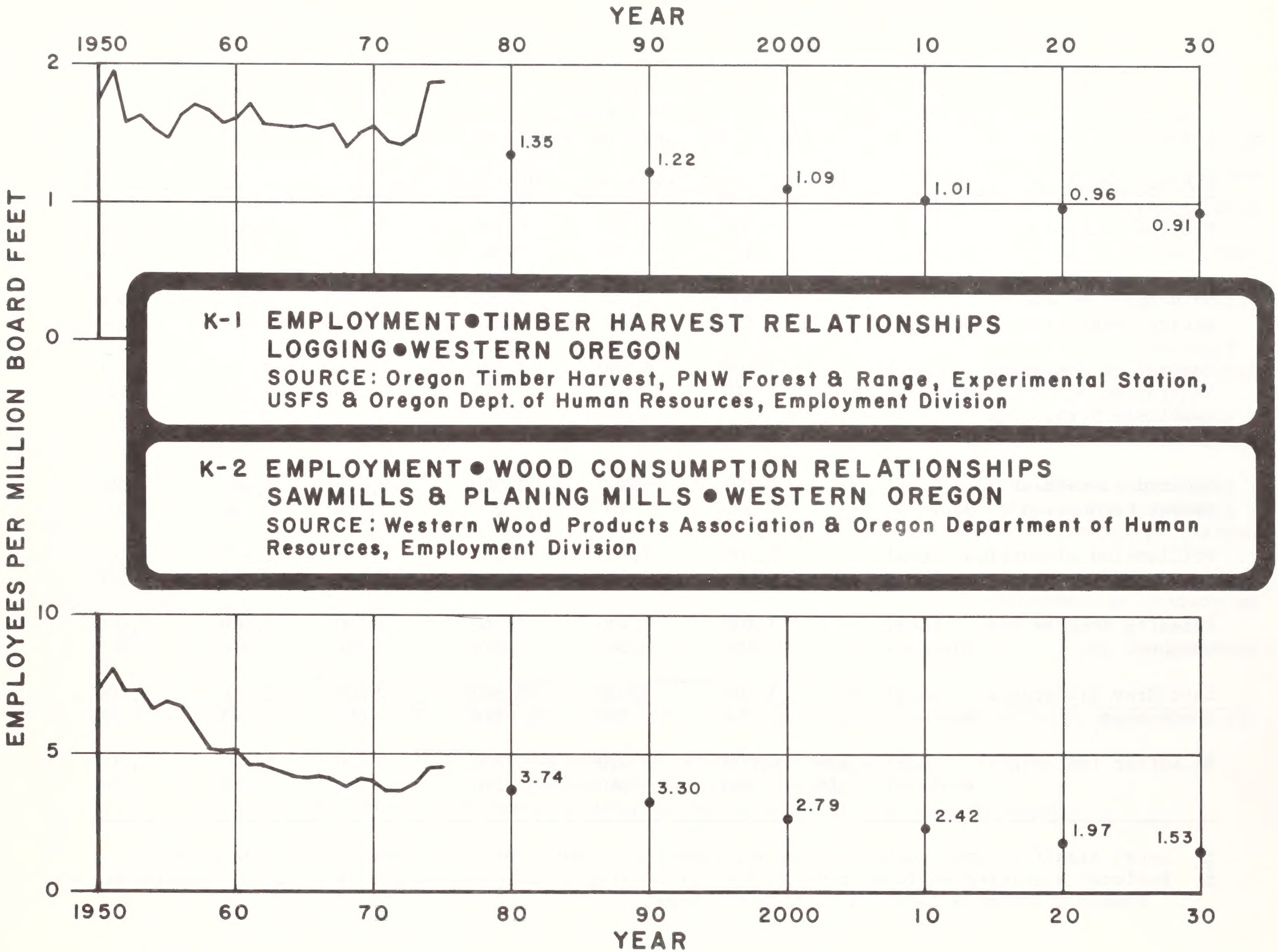
The next step in the analysis was to determine the direct employment supported by the timber harvest in the Medford Timbershed for the projection period. Employment was projected for logging, sawmills and planing mills, and veneer and plywood plants. Mill residue from the Medford Area supports pulp and paper manufacture in Oregon and so employment in pulp, paper, and building paper was calculated based on the mill residue supply. There are no pulpmills in the Medford Timbershed as this employment occurs elsewhere in the State.

In order to project logging employment, the relationship between logging employment and timber harvest was examined. Logging employment-timber harvest ratios were developed for western Oregon for the 1950-75 period. These ratios are plotted in Figure K-1. Between 1950 and 1973 the ratios show a declining trend indicating that productivity has been increasing. In 1974 and 1975, when there was a sharp recession and log harvest dropped, the employment-timber harvest ratios rose to levels experienced in the 1950's. It is not likely that these are representative of the future where high demand for timber products is projected. A regression of employment ratios over time was developed for the 1950-73 and 1950-75 periods. The regression for the 1950-73 period was chosen and extrapolated into the future. This regression was modified to show a reduced rate of productivity after the year 2000 due to the smaller timber size projected for that period. At the end of the projection, the rate declines 5 percent per decade. To project logging employment, the extrapolated employment-timber harvest ratios are mutiplied by the projected harvest for each time period.

Employment-wood consumption relationships were developed for sawmills and planing mills in western Oregon for the 1950-75 period (Figure K-2). The ratios declined rapidly during the 1950's and declined more slowly in later years. A regression relating employment-wood consumption ratios was developed for the 1960-75 period. This linear relationship is downward sloping showing the effects of increasing productivity. This relationship was extrapolated to the year 2030. New sawmill technology is developing at a rapid pace and it seems reasonable to assume that this new technology will be utilized in the Medford Timbershed in the future. Firms will have to compete with sawmills utilizing new technology elsewhere on the Pacific Coast. The extrapolated relationships were multiplied by the projected saw log consumption for each time period to arrive at projected employment.

For the veneer and plywood industry, employment-wood consumption ratios were calculated for the 1950-75 period for Oregon (Figure K-3). The employment ratios decline sharply during the 1952-64 period and then decline more slowly for the last 10 years. It is evident that productivity has been increasing and we can expect it to continue to increase. A regression of employment ratios related to time was developed for the 1965-75 period. This regression was extrapolated to the year 1990 and then a slower rate of change was assumed. It was assumed that productivity would increase at 10 percent per decade in the latter part of the projection period. When extrapolated too far, historic rates of change often produce absurd results. To project veneer and plywood employment, the extrapolated employment-wood consumption ratios were multipled by the projected veneer-log consumption for each point in time.

For the pulp, paper, and building paper industries (SIC 2611, 21, 31, 61) in Oregon, employment-wood consumption ratios were calculated for the 1958-74 period (Figure K-4). The ratios decline rapidly showing the sharp gains in productivity. The ratios show a slower rate of decline during the 1966-74 period and it was extrapolated to 1980. No new pulpmills are planned



K-1 EMPLOYMENT • TIMBER HARVEST RELATIONSHIPS
LOGGING • WESTERN OREGON
SOURCE: Oregon Timber Harvest, PNW Forest & Range, Experimental Station, USFS & Oregon Dept. of Human Resources, Employment Division

K-2 EMPLOYMENT • WOOD CONSUMPTION RELATIONSHIPS
SAWMILLS & PLANING MILLS • WESTERN OREGON
SOURCE: Western Wood Products Association & Oregon Department of Human Resources, Employment Division

Table K-1

Employment Supported in Logging and Primary Processing by Timber Harvest in the Medford Timbershed under Timber Harvest Alternatives for BLM: Josephine Sustained Yield Unit

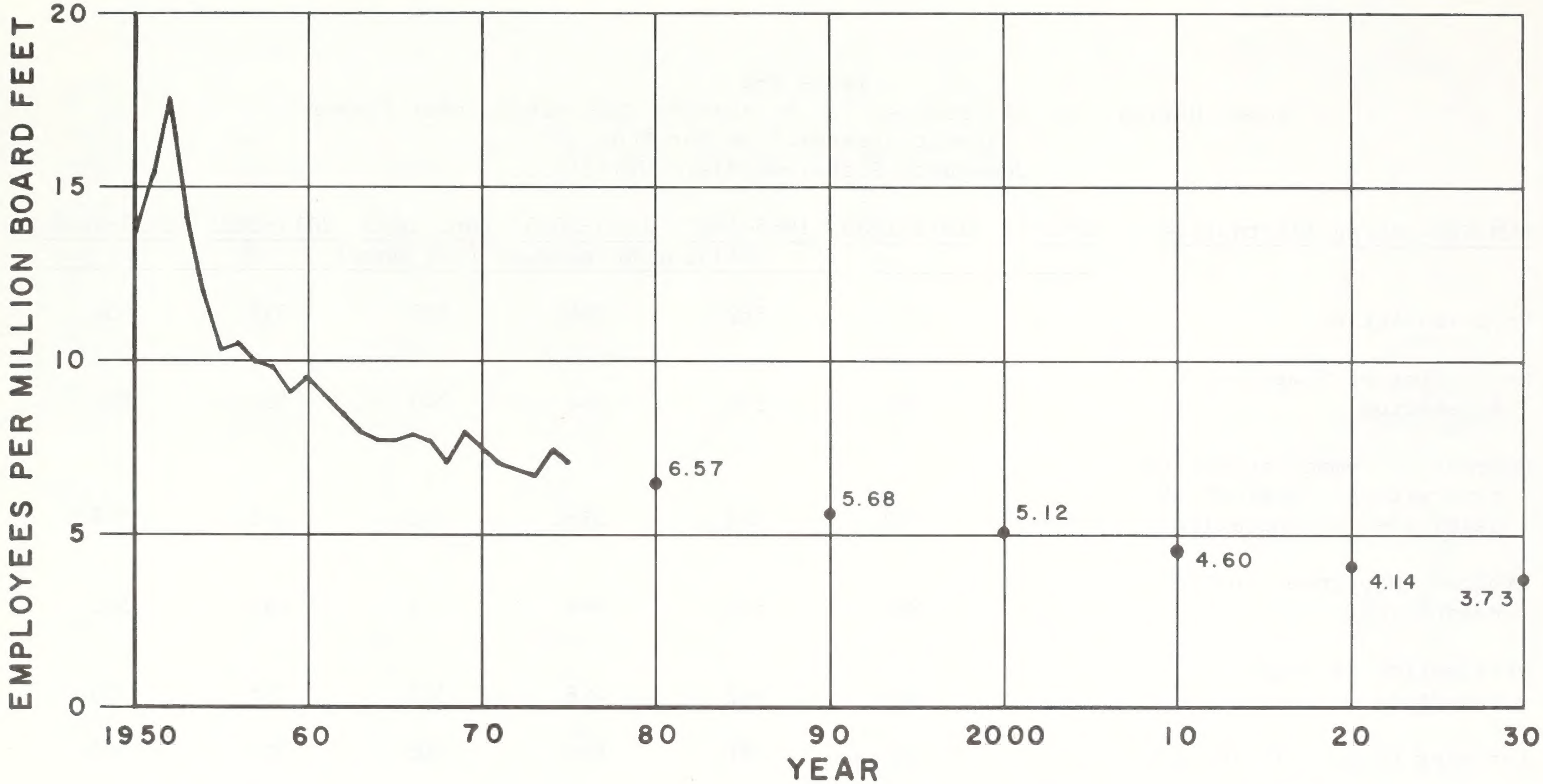
BLM Management Alternatives		1970	1975-1985	1985-1995	1995-2005	2005-2015	2015-2025	2025-2035
Proposed Action	Local[1/]	--	3,800	3,200	2,300	2,600	2,300	2,000
	Nonlocal[2/]	--	370	320	240	260	230	210
No Control of Competing Vegetation	Local	--	3,700	3,100	2,200	2,500	2,200	1,900
	Nonlocal	--	350	310	220	250	220	200
Control of Competing Vegetation all Available Herbicides Except Silvex	Local	--	3,800	3,200	2,300	2,600	2,400	2,100
	Nonlocal	--	370	321	240	260	240	220
Limited Investment in Timber Production	Local	--	3,700	3,200	2,300	2,500	2,300	2,000
	Nonlocal	--	360	310	240	260	40	210
Utilization of Surplus Inventory	Local	--	3,800	3,200	2,300	2,600	2,400	2,100
	Nonlocal	--	370	320	240	260	240	220
Forestry Program for Oregon	Local	--	3,900	3,400	2,500	2,800	2,200	2,000
	Nonlocal	--	380	340	250	280	230	210
Zane Grey Wilderness Study Area	Local	--	3,700	3,200	2,300	2,600	2,400	2,100
	Nonlocal	--	350	320	230	260	240	220
No Action (no change)	Local	4,434	4,000	3,400	2,500	2,800	2,500	2,200
	Nonlocal	566	390	340	250	280	260	230

1/ Local signifies employment in logging, sawmills, planing mills, or veneer and plywood mills.
2/ Nonlocal signifies employment created by processing of coarse residues from Jackson-Josephine County mills at a location outside the area.

Table K-2
Timber Harvest for all Sources in the Medford Timbershed Under Timber Harvest Alternatives for BLM: Josephine Sustained Yield Unit[1/]

BLM Harvesting Alternative	1968-78	1975-1985	1985-1995	1995-2005	2005-2015	2015-2025	2025-2035
	(million board feet (Scribner)						
Proposed Action	--	580	562	456	565	556	554
No Control of Competing Vegetation	--	558	540	434	543	534	532
Control of Competing Vegetation with All Available Herbicides Except Silvex	--	580	562	456	565	556	554
Limited Investment in Timber Production	--	568	550	444	553	544	542
Utilization of Surplus Inventory	--	584	562	456	565	556	554
Forestry Program for Oregon	--	594	586	487	603	526	525
Zane Grey Wilderness Study Area	--	577	559	453	562	553	551
No Action (No change)	603	609	599	494	603	593	592

1/ Differences among alternatives reflect only the portion of the JSYU contained within the boundaries of the Medford Timbershed.



K-3 **EMPLOYMENT • WOOD CONSUMPTION RELATIONSHIPS VENEER & PLYWOOD • OREGON**

SOURCE: American Plywood Association & Oregon Department of Human Resources, Employment Division

for Oregon and people in the industry expect productivity increases to slow down for new investment will mean incremental changes in productivity in existing plant facilities. It is not logical for the present rate of change in the employment ratios to continue. Therefore, it was assumed that after 1980 the employment ratios would decline at 10 percent per decade. The trend employment ratios for 1970 was 1.64 employees per thousand tons of wood consumption and by 1980 this would drop to 1.1078 employees per thousand tons. By 2030 the ratio is projected to drop to 0.654 employees per thousand tons. Pulp, paper, and building paper employment was calculated by multiplying the employment-wood consumption ratio by the projected wood consumption for this industry.

Projected timber harvest will support logging employment in each time period in the Medford Timbershed.

The next step was to calculate saw log consumption and veneer log consumption for the Medford Timbershed. In 1972 it was found that about 48 percent of the roundwood consumption in Jackson and Josephine Counties went to sawmills. About 52 percent went to veneer and plywood plants. It is assumed that this distribution of logs remains constant for the projection period. Future saw log consumption which will support Medford Timbershed employment was 48 percent of the projected harvest in each time period. Future veneer log consumption was 52 percent of the future log harvest. Employment in sawmills and veneer and plywood plants was then calculated for the projection period.

There are no pulp or paper plants in the Medford Timbershed. The residue from sawmills and veneer and plywood plants will support pulp and paper employment elsewhere in Oregon. A wood residue projection is made to determine the pulpwood consumption supported by the Medford Timbershed. The production of lumber and plywood was calculated for the timbershed for the projection period. Knowing the production of lumber and plywood, the volume of coarse residue generated was calculated for the timbershed for the projection period. Not all of the coarse residue is used for pulp and paper. It was assumed that 79 percent of the residue supply will be consumed for pulp and paper manufacture in Oregon during the projection period.

Employment Projection for Beuter et al., Run A-1

Based on the 1968-73 average harvest and the 1970 employment ratios, it was calculated that the Medford Timbershed harvest supported 4,434 employees in logging sawmills, and veneer and plywood plants. Under the Beuter's Run A-1, employment in these categories will drop 43 percent by the year 2000 due to increases in productivity and decreases in timber harvest. In 1970 it was calculated that 566 employees were supported in the pulp, paper, and building paper industry in Oregon by residues from the Medford Timbershed. By the year 2000, only 250 employees will be supported in pulp and paper in Oregon based on the Medford timber harvest. This employment projection is the result of the BLM's No-Action timber harvesting alternative. The results of this run are presented in Table K-1.

After the year 2000 when log production in Run A-1 increases, employment in logging and sawmills increases above the year 2000 level, but remains substantially below the 1970 level of employment. By 2030 employment is projected to reach an all-time low of 2,200 employees in sawmills, veneer and plywood plants, and logging.

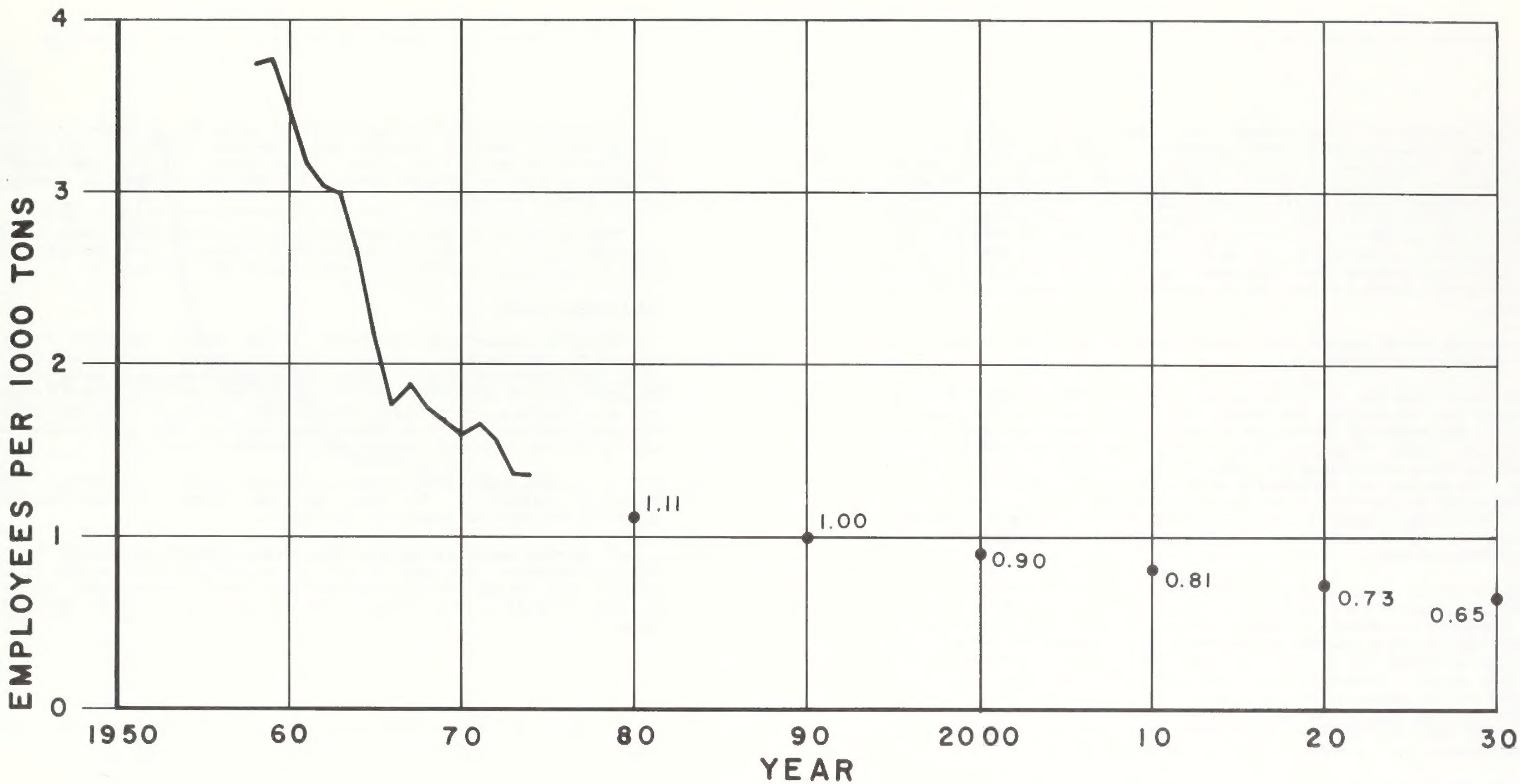
This employment model was used for each one of the BLM's timber harvest alternatives in the Josephine Sustained Yield Unit. (For definition of alternatives, refer to Chapter 8 of the environmental statement.)

Employment Impacts

Direct employment was calculated for the Medford Timbershed for each BLM alternative. Employment was calculated for logging, sawmills and planing mills, and veneer and plywood plants. Employment based on imports into the timbershed was not calculated. Miscellaneous lumber and wood products employment not directly affected by the timber harvest alternatives was not included. Pulp and paper employment in Oregon supported by primary mill residues was calculated. The employment results are presented in Table K-1.

It is concluded that the highest employment levels are generated by the No Action alternative. The lowest employment levels are shown under the No Control of Competing Vegetation alternative.

All of the employment projections show declining employment for the Medford Timbershed. Increases in labor productivity account for most of this decline. Also between 1970 and 2000 employment drops because timber output is projected to decline. This is due to the declining harvest on forest industry lands.



K–4 EMPLOYMENT • WOOD CONSUMPTION RELATIONSHIPS
PULP & PAPER • OREGON
SOURCE: Northwest Pulp & Paper Association & Oregon Department of Human Resources, Employment Division

Appendix L

Applicability of Section 603 of the Federal Land Management and Policy Act of 1976 to the O&C and Coos Bay Wagon Road Lands.

(July 1, 1977, Memorandum from the Office of the Solicitor has been retyped for clear reproduction).

COPY

United States Department of the Interior
OFFICE OF THE SOLICITOR
WASHINGTON, D.C. 20240

IN REPLY REFER TO:

June 1, 1977

Memorandum

To: Director, Bureau of Land Management

From: Acting Deputy Solicitor

Subject: Applicability of Section 603 of the Federal Land Policy and Management Act of 1976 to O & C and Coos Bay Wagon Road Lands

On January 12, 1977 you requested our opinion on the applicability of the provisions of section 603 of the Federal Land Policy and Management Act (FLPMA), P.L. 94-579, 90 Stat. 2743 (1976), to the Oregon and California and Coos Bay Wagon Road Lands (O & C Lands). As explained below, I conclude that the mandatory review requirements of FLPMA are applicable only to those portions of the O & C lands which are not suitable for commercial forest management. In other words, to the extent the section 603 provision conflicts with commercial forest management of suitable portions of the O & C lands, the former must yield. Where the two statutes are consistent, the provisions of section 603 apply.

LEGISLATIVE HISTORY

A. Section 603 of FLPMA

Section 603 of the Federal Land Policy and Management Act of 1976 (FLPMA) requires review for consideration of wilderness preservation of "those roadless areas of five thousand acres or more and roadless islands of the public lands, identified . . . as having wilderness characteristics described in the Wilderness Act of September 3, 1964 (78 Stat. 890; 16 U.S.C. 1131) . . .". The term "public lands" is defined in section 103(o) of the Act as, "any land or interst in land owned by the United States . . . and administered . . . through the Bureau of Land Management without regard to how the United States acquired ownership. . .". Only lands on the Outer Continental Shelf and lands held for the benefit of Indians, Aleuts and Eskimos are excepted from this definition.

COPY

The legislative history of the FLPMA reveals that inclusion of a mandatory wilderness review provision was intended to clarify the provisions of the Wilderness Act and make wilderness review and wilderness management obligations applicable to public lands. Prior to FLPMA, though the introductory language of the Wilderness Act referred to all Federal lands, wilderness review requirements specifically applied only to lands within National Parks, Wildlife Refuges, and National Forests. The Secretary did set aside certain public lands as "primitive areas" by administrative action though and management was virtually the same as for lands formally a part of the National Wilderness Preservation System. See Foster, "Bureau of Land Management Primitive Areas--Are They Counterfeit Wilderness," 16 Natural Resources J. 621 (1976). Problems arose, however, because the program lacked an affirmative statutory base. See F. H. Stoltze Land & Lumber Co. v. Kleppe, Civ. No. 75-136-M (D. Mont. filed Oct. 24, 1975) (Action challenging validity of primitive area designation).

The FLPMA provisions, while not amending the Wilderness Act, provide the missing affirmative statutory base for review and protection of lands suitable for designation as wilderness, in accordance with the provisions of the Wilderness Act. (S. Rep. No. 583, 94th Cong., 1st Sess. 44 (1976)).

Section 603(c) of the FLPMA imposes management restrictions on the Secretary, during the period of review for wilderness potential. Wilderness study areas must be managed so as not to impair their suitability for preservation as wilderness, subject to the continuation of mining, grazing uses, and mineral leasing, in the manner and degree in which such uses existed on the date of approval of the Act. The language of this subsection was adopted from the House version of FLPMA. H.R. 13777, 94th Cong., 1st Sess. (1976). The Senate version provided that the review of an area identified as possessing wilderness characteristics shall not, of itself, change or prevent change in the management or use of the lands. S. 507, 94th Cong., 1st Sess., section 103(d)(1976). The Senate Interior and Insular Affairs Committee report noted that this provision was intended to assure that during the review period the pattern of uses on the public lands would not be frozen, nor would existing uses automatically be terminated. S. Rep. No. 94-583, 94th Cong., 1st Sess. at 42. Whether existing uses would continue or new uses would begin during the review period was left to Secretarial discretion, subject to the need to preserve wilderness characteristics.

The Conference Committee discussed interim management of wilderness study areas at some length. See, U.S. Senate, Senate-House Conference on S. 507, Transcript of Proceedings on September 22,

1976 at 87-97. The staff took the position that the provision of the House bill gave effect to the intent of the Senate in its provision. Senator McClure introduced an amendment to restore discretion to the Secretary as to management during the review period, subject to the House provison that the Secretary "take any action necessary to prevent undue degradation of the land" during the review period. This amendment was rejected as failing to provide a special mandate to the Secretary to protect study areas during the study period. Id. at 96.

B. Section 701(b) of FLPMA.

The question of the applicability of section 603 of FLPMA to the O & C lands arises because of the language of section 701(b) of the FLPMA, which provides as follows:

> (b) Notwithstanding any provision of this Act, in the event of conflict with or inconsistency between this Act and the Acts of August 28, 1937 (50 Stat. 874; 43 U.S.C. 1181a-1181j), and May 24, 1939 (53 Stat. 753), insofar as they relate to management of timber resources, and disposition of revenues from lands and resources, the latter Acts shall prevail.

The legislative history of FLPMA does not shed any light on the reason for the inclusion of this specific reference to the O & C Act of August 28, 1937, in this section. The language first appeared in Committee Print #5 of H.R. 5441 (93d Cong., 2d Sess. 1975), but was not discussed during the Committee mark-up of the print. The language was retained in H.R. 13777 when it was introduced in the 94th Congress. S. 507 made no reference to resolution of inconsistencies between the FLPMA and the O & C Act. The House provision was included in the Conference Committee print, and was not discussed during meetings of the Conference Committee, nor mentioned in its report. H.R. Rep. No. 1724, 94th Cong., 2d Sess. (1976).

The effect of this provision was discussed by members of Congress and the Department during consideration of earlier proposals for the Organic Act. For example, in 1972 Senator Hatfield sought assurances that the Organic Act would not affect timber management or revenue distribution on the O & C lands. During hearings on S. 2401 (92d Congress), the Senator expressed concern that the provision for wilderness review included in section 102 of Committee Print No. 1 would affect the management and distribution of receipts on O & C lands. Assistant Secretary Loesch assured him by letter dated September 15, 1972, that although the wilderness

provision in Print No. 1 could have affected the O & C lands, it had been deleted from the second Committee print. No further explanation was given. The wilderness provision was not included in S. 2401 as introduced or as reported.

In 1973, during hearings in the 93d Congress on S. 424, Senator Hatfield raised the matter again. He stated that Assistant Secretary Loesch had assured that, ". . .in neither case [Committee Print Nos. 1 or 2 one with and one without the wilderness provision] would the organic act proposal affect either the present management or the present distribution of the receipts from the O & C lands." (emphasis added). As noted above, Loesch said that the print with the wilderness provision could have affected the O & C lands. Senator Hatfield then asked the witness, Undersecretary Whitaker, whether this was still the Department's opinion. Secretary Whitaker responded that, "Senator, I would like to reafffirm for the record that it is a fact, that it does not affect the funding, formula, or management of the O and C lands." See Hearings on S. 424 before the Subcommittee on Public Lands of the Senate Committee on Interior and Insular Affairs, 93d Cong., 1st Sess. at 44-45 (1973). It should be noted, however, that S. 424, the bill under consideration, had once again dropped the wilderness provision. Such a provision was, however, included in the bill as it was reported and passed. There was no further Congressional discussion of the effect of FLPMA on the O & C lands.

ANALYSIS

By the terms of section 701(b), wilderness identification and review under section 603 of the Act is applicable to the O & C lands only to the extent that wilderness review and management of O & C lands for wilderness is consistent with the O & C Act of August 28, 1937. Section 1 of the O & C Act provides as follows:

> Notwithstanding any provisions in the Acts of June 9, 1916 (39 Stat. 218), and February 26, 1919 (40 Stat. 1179), as amended, such portions of the revested Oregon and California Railroad and reconveyed Coos Bay Wagon Road grant lands as are or may hereafter come under the jurisdiction of the Department of the Interior, which have heretofore or may hereafter be classified as timber lands, and power-site lands valuable for timber, shall be managed, except as provided in section 1181c of this title, for permanent forest production, and the timber thereon shall be sold, cut, and removed in conformity with the principal (sic) of sustained yield for the purpose of providing a permanent source of timber

> supply, protecting watersheds, regulating stream flow, and contributing to the economic stability of local communities and industries, and providing recreational facilities. (43 U.S.C. 1181a) (emphasis added).

In order to determine whether wilderness review and management is consistent with the O & C Act, it is first necessary to decide whether the O & C Act dictates what may be characterized as "exclusive", "dominant", or "multiple use" management.

The O & C Act is expressly not an exclusive use Act. It directs that the O & C lands be managed to provide a source of timber supply, protect watersheds, regulate stream flow, contribute to the economic stability of local communities and provide recreational facilities. Less clear is whether the Act envisions management for true multiple-use, or for dominant use.

Prior to the Act of August 28, 1937, the revested O & C lands were administered in accordance with the Act of June 9, 1916 (39 Stat. 219) which called for Government disposition of the land and the timber thereon. No provision was made for the administration of the land under a conservation policy looking toward use and preservation of its natural resources. Congressional realization that this disposition policy was wasteful and not in the public interest resulted in the measure which was enacted on August 28, 1937, the "O & C Act" quoted above. The House Committee on the Public Lands, in its report on the bill, H.R. Rep. No. 1119, 75th Cong., 1st Sess. (1937), declared that the purpose of the management provision was, "to provide conservation and scientific management for this vast Federal property which now receives no planned management beyond liquidation of timber assets and protection from fire." Id. at 2. The Committee decided that the management of classified timber land for permanent, sustained yield, forest production was conducive to more permanent communities, financial stability of local industries, protection of watersheds, provision of recreation and regulation of streamflow. Id. In Addition to management directives, the O & C Act provided that receipts from the O & C lands be paid to local counties (Revenue payments to counties containing Coos Bay Wagon Road lands are distributed under a different statute, Act of May 24, 1939, 53 Stat. 753).

The concepts of multiple use and dominant use management are both quite fuzzy. See Sierra Club v. Hardin, 325 F. Supp. 99 (D. Alas. 1971); Dorothy Thomas Foundation v. Hardin, 317 F. Supp. 1072 (D. N.C. 1970). See also Behan, "The Succotash Syndrome or Multiple Use: A Heartfelt Approach to Forest Land Management," 7 Natural Resources J. 473 (1967); Hall, "The Myth and Reality of Multiple

Use Forestry," 3 Natural Resources J. 276 (1963); Loesch, "Multiple Uses of Public Lands - Accommodation or Choosing Between Conflicting Uses," 16 Rocky Mt. Mining & Mineral L. Inst. 1 (1971); Whaley, "Multiple Use Decision Making--Where Do We Go From Here?" 10 Natural Resources J. 557 (1970); and Comment, "Managing Federal Lands: Replacing the Multiple Use System," 82 Yale L. J. 787 (1973).

FLPMA defines "multiple use" as:

> the management of the public lands and their various resource values so that they are utilized in the combination that will best meet the present and future needs of the American people: making the most judicious use of the land for some or all of these resources or related services over areas large enough to provide sufficient latitude for periodic adjustments in use to conform to changing needs and conditions; the use of some land for less than all of the resources: a combination of balanced and diverse resource uses that takes into account the long-term needs of future generations for renewable and nonrenewable resources, including, but not limited to, recreation, range, timber, minerals, watershed, wildlife and fish, and natural scenic, scientific and historical values; and harmonious and coordinated management of the various resources without permanent impairment of the productivity of the land and the quality of the environment with consideration being given to the relative values of the resources and not necessarily to the combination of uses that will give the greatest economic return or the greatest unit output. P.L. 94-579, section 103(c).

This definition is a broader and more flexible management mandate than the management directive in the O & C Act quoted above. Multiple use management emphasizes equality of all uses; uses are harmonized and coordinated and while each acre is not managed for every use, all uses are given equal consideration by the land manager. Under dominant use management, all uses are not on equal footing. Any use conflicting with the dominant use is not allowed.

The legislative history and specific provisions of the O & C Act force the conclusion that it mandates dominant use management of the O & C Lands for commercial forestry. This has been the view of the Department in the past. See, e.g., Solicitor's Opinion M-30506, March 9, 1940 (holding that O & C lands could not be withdrawn for inclusion in Oregon Caves National Monument) and

Instruction of the Assistant Secretary, August 25, 1941 (holding that the Mining Law of 1872 did not apply to O & C lands). Rather than allowing equal consideration of all land uses, the O & C Act requires that the lands be managed for commercial forestry if suitable. Other uses, such as recreation, are allowed only when subordinated to commercial forest management.

Having concluded that the O & C Act is a dominant use statute, we must determine whether dominant commercial forest management is consistent with the mandatory wilderness review required by section 603 of FLPMA. It is settled that multiple use and wilderness management are consistent as evidenced by the long experience of the Forest Service under the Multiple Use Sustained Yield Act, 16 U.S.C. 528-531 (1970), and the Wilderness Act, 16 U.S.C. 1131-1136 (1970). It is also settled that timber may not be harvested on lands under review for wilderness designation except in very limited circumstances. Parker v. United States, 448 F.2d 793 (10 Cir. 1971) cert. denied 405 U.S. 989. See also 36 C.F.R. 293.6 (1976). If section 603 applies to the O & C lands, timber could not be harvested until the wilderness review of qualifying roadless areas was completed. This leads me to conclude that where the mandatory wilderness review provision of section 603 would prevent management of commercial timber on the O & C lands, the O & C Act must prevail.

Congress has recognized, however, that some O & C lands might be unsuitable for timber production. Section 701(b) of FLPMA expressly requires that the wilderness review provisions of FLPMA must yield only to the extent they are inconsistent with the "managment of timber resources" as provided for the O & C Act. This means that the Bureau is not authorized to take an action which would destroy the wilderness quality of an area in advance of reviewing the area's wilderness potential, if the action contemplated is not in a commercial forest area, or not for the purpose of commercial forest managment. For example, if a fish hatchery or campground is proposed, these uses are unrelated to commercial timber production and therefore the conflict with FLPMA between timber management and wilderness review does not exist. Furthermore, if in the course of land use planning, roadless areas unsuitable for commercial forest management are identified, they must be reviewed pursuant to section 603.

Your request of January 12 did not ask whether BLM approval of an action (such as issuance of a right-of-way permit) which would destroy the wilderness character of an area must be accompanied by an environmental impact statement, wholly apart from the wilderness review provision. There is authority for the position that an EIS

is required. See Wyoming Outdoor Coordinating Council v. Butz, 484 F.2d 1244 (10th Cir. 1973). We therefore assume you will consider the applicability of the National Environmental Policy Act to such actions even on the O & C lands.

CONCLUSION

In light of the foregoing analysis, I must conclude that the mandatory wilderness review provisions of section 603 of FLPMA cannot be applied to those areas of the O & C lands which are being managed for commercial timber production. Section 603 must be applied, however, to those areas which are not being managed for commercial timber production. The Bureau is therefore not authorized to take any action which would destroy the wilderness quality of an area before reviewing its wilderness potential, if the land in question is not in a commercial forest area, or the action proposed is not for the purpose of commercial forest management.

/s/ Frederick N. Ferguson

Acting Deputy SOLICITOR

cc:
Regional Solicitor/Portland

Appendix M

Comment Letters

Appendices included with letters 26 and 30, the enclosure indicated on page 2 of letter 37 and the policy statement included with letter 44 are available for review at the Oregon State Office of BLM.

DOUGLAS TIMBER OPERATORS, INC.
SUITE 222, PACIFIC BUILDING
727 S. E. CASS AVENUE
ROSEBURG, OREGON 97470

April 7, 1978

2

Mr. Murl Storms
State Director
Bureau of Land Management
P.O. Box 2965
Portland, Oregon 97208

RE: COMMENTS REGARDING JOSEPHINE SUSTAINED YIELD UNIT TIMBER MANAGEMENT DRAFT ENVIRONMENTAL STATEMENT

The Douglas Timber Operators is an association of wood manufacturing, logging and related firms in the Douglas County area. All of our 30 members rely, in varying degrees, on federal forest lands for a continuous supply of timber to operate their businesses. The Beuter Report has forecasted a 22% decline in available timber supply in western Oregon between now and the year 2000. However, Beuter's prediction assumed that production levels on all federal lands would remain essentially the same as they were at the time of the study. During the two years since the study was completed, we have seen overwhelming evidence that this will not be the case. Commercial land base withdrawls, a reluctance by Congress to adequately fund federal forest agencies and uneconomical harvest regulation have forced production levels down on most timbersheds. Consequently the timber supply shortage will be much more severe than we originally believed. In many, if not most cases, we feel these declines are not necessary and can be avoided with agressive management. The proposed 40 million foot reduction on the Josephine Unit is a prime example. A considerable portion of our membership purchases timber in the Josephine Unit and over 80,000 acres of the Unit is in Douglas County. On behalf of those members and the economic welfare of southern Oregon, we offer these comments and suggestions in an effort to improve the final proposal.

It is quite obvious that the underlying cause for the proposed action is the findings of the Timber Productivity Capability Classification. The TPCC resulted in the "high intensity" land base (that from which the allowable cut is calculated) being eroded from 334,500 to 222,896 acres. The loss of 112,000 acres from the allowable cut base necessitated a 40 million foot reduction in the allowable cut. We agree that a reduction in harvest of this magnitude is valid <u>if</u> these lands are indeed unmanageable. The BLM contends that these areas cannot be regenerated within five years so, consequently, are not suitable for intensively managing their timber resources. Herein lies the most glaring deficiency of your planning process. You seem to have taken a defeatist's attitude towards managing these lands. There is substantial evidence on other ownerships that productive timber management is both feasible and profitble on these "low intensity" sites. Furthermore, a study of the TPCC done by Mason, Bruce and Girard for the Association of O & C Counties indicated

that 18% of the withdrawn lands had been improperly allocated while 32% were partially misclassified under your own guidelines. If approached with the proper attitude, much of the 112,000 acres withdrawn from the "high intensity" base could be included in the allowable cut calculation. I strongly urge you to reconsider your TPCC study and, if necessary, redo the TPCC before preparing a final statement. Also, as technological advances enables prudent management of these difficult sites, they should be returned to the "high intensity" classification immediately and the annual harvest should be recalculated.

A bright spot in the proposed alternative is the management program the BLM has prescribed for the 223,000 acres remaining in the "high intensity" classification. Your proposed use of herbicides, fertilization, precommercial and commercial thinning, and reforestation plans are fine examples of the aggressive type of management that is necessary to sustain and increase timber production in southern Oregon. However, the proposed alternative would totally ignore these investment opportunities on "low intensity" lands. No reforestation, herbicide release, thinning, or fertilization is scheduled for these areas. Research indicates that returns from these practices is often greatest on low site land and yet none has been proposed on the Josephine Unit. The Mason, Bruce, and Girard study indicated that many of these withdrawn lands were improperly planted and had undergone insufficient site preparation prior to reforestation which resulted in them being taken out of the "high intensity" category. It is discouraging that the BLM is willing to "write off" these difficult areas at a time when federal forest lands play an increasingly critical role in the economic welfare of southern Oregon.

The BLM should make an aggressive attempt to manage the "low intensity" areas. All available technology should be reviewed and a stone should not go unturned to assure that everything possible is done to tap the productivity of these lands. For example, great strides have been made in the field of nursery management that allows the production of seedlings especially suited to specific areas. Drought hardiness, animal resistance and frost resistance are physiological and morphological characteristics that can be promulgated in the nursery. If current technology is not sufficient to permit prudent management of these areas, the BLM should pursue whatever research is necessary to restore the areas into the allowable cut base.

There appears to be several opportunities to ameliorate the severity of the harvest decline that have not been explored by the BLM. For example, there is over 84,000 acres on the Unit with timber in excess of 260 years old exhibiting negative growth rates. Since these stands are losing volume, it seems senseless not to accelerate harvest of them. Even if it takes ten or fifteen years to reforest the site, there will be no impact on the long run sustained yield since the timber was losing growth to begin with! Such an approach could reduce the economic impact of a 40 million foot reduction in harvest and also allow time to develop necessary technology to bring the "low intensity" lands into full production.

BLM's new spotted owl management guidelines were not addressed in the draft statement. It is our understanding that the Josephine Unit will be required to preserve habitat for 14 pairs of owls. Each pair will be allocated a 300 acre old growth core area and an additional 900 acres of second growth type vegetation. In total, the owls will impact 16,800 acres of the Unit. This impact should be addressed in the Final Statement.

The economic impact of the proposed alternative is very hard to comprehend as presented in the draft statement. For example, how the BLM accounts for secondary employment impacts is not clear. In fact, it is questionable that secondary employment impacts were considered at all. A study recently completed by Drs. Beaton and Hibbard at Willamette University showed that 18 jobs are dependent on each million board feet of timber harvested in Douglas County. Approximately seven of those are supplied directly by the forest products industry, while eleven are secondary jobs in services and trades. In other words, each forest industry job supports about 1.6 secondary jobs. This is much larger than your estimate in the DEIS and is a conservative figure according to Beaton and Hibbard. Based on our data, a 40 million foot reduction in timber harvest would result in the loss of about 720 jobs versus your estimate of 370 jobs. The BLM has severely underestimated the economic impact of their proposal. The socio-economic assessment should be reevaluated and summarized in layman's terms. Southern Oregon residents should be made aware of the impact a 40 million board foot reduction in timber supply will have on the local economy. Also the impact should be broken down amongst counties. For example, Douglas County is expected to absorb 16 million feet of the total reduction. Mills in the Glendale and Riddle area will be adversely affected by the cutback. The final EIS should specify these impacts.

To summarize, the major deficiencies of the proposed action for the Josephine Timber Management Plan are:

1. The TPCC reflects a defeatist's attitude towards timber management. The TPCC should be redone and reflect an agressive effort to develop the potential of the "low intensity" forest lands.

2. The proposal demonstrates a reluctance to invest in "low intensity" forest lands. An intensive management program should be initiated on these low site lands in an effort to return them to the allowable cut base. Research needs must be identified and implemented as soon as possible.

3. Insufficient effort has been expended in trying to find alternatives to avoid the 40 million foot harvest reduction. Opportunities to capture massive old growth mortality should be evaluated.

4. The socio-economic analysis should be clarified and simplified to be understandable to the layman. The economic impact is understated and should be reevaluated.

On behalf of the Douglas Timber Operators, I would like to express our appreciation for the opportunity to comment on the proposed action on the Josephine Sustained Yield Unit. We hope our comments will be useful to you and urge you to do everything possible to revise the proposal in the best interests of the southern Oregon economy. Thank you.

Sincerely,

Jim Geisinger

Jim Geisinger
Executive Director, DTO

JG/mw

NORTH WEST TIMBER ASSOCIATION
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April 7, 1978

3

Mr. Murl Storms
State Director
Bureau of Land Management
P.O. Box 2965
Portland, OR 97208

SUBJECT: Josephine Sustained Yield Unit Ten-Year Timber Management Plan

North West Timber Association consists of wood manufacturing firms operating in Western Oregon who rely almost exclusively on Public Timber. A number of our members operate on the Josephine Unit and will be severely effected by the 40 million foot reduction in harvest contained in your proposed action. For this reason we have been, and continue to be, extremely concerned and interested in your timber management plans. It is unfortunate, whether as the result of mismanagement as many believe, or as the result of miscalculation in the past, that we have reached a point where a significant portion of an area dominant industry may be laid to rest. Such a decision is of major importance and this harvest reduction must be avoided if at all possible within the constraints of good forest management. It is hoped that you will give our Association position your attention and consider our concerns and suggestions thoroughly prior to preparing the final draft of the Plan.

As is usual with the review of such documents, my comments will be mainly of a critical nature in hopes that it improves the resulting action. Some comments are also aimed at improvement of the document itself. Before proceeding, I would like to compliment your organization on doing a very complete and comprehensive job. It would appear that hardly a stone has gone unturned, and that all impacts have been addressed in detail. You are also to be commended on your obvious dedication to utilizing the tools of intensive management in meeting your assigned responsibilities.

RECOMMENDATIONS REGARDING PROPOSED ACTION

Having followed the development of your plan for over two years and having reviewed the draft statement to the degree possible in the limited time alloted, I am not convienced that the drastic reduction in harvest is indeed necessary. The following recommendations are thus aimed at develcping a more acceptable proposed action and/or minimizing the disastrous effect your action will have if implemented.

RECOMMENDATION I. A new Timber Productivity Capability Classification (TPCC) Survey should begin immediately. The removal of over 100,000 acres from the "high intensity lands" is the cause of the major reduction in harvest from the unit. In turn, the land base is the result of the TPCC survey, and it is thus the most important single activity in developing the plan. It appears that land classification was the result of a when in doubt throw it out" approach. This conclusion is supported by the O & C Counties Association sponsored study by Mason Bruce and Girard which showed that 18% of the units withdrawn were improper (using BLM criteria) and that another 32% of the sample were partially incorrect. The serious nature of these findings should be recognized and both the criteria used for classifying the lands and the classification itself should be reevaluated.

It is recognized that you cannot delay implementation of a new Timber Management Plan until a new TPCC is completed. However, you should schedule a reexamination of the lands immediately and the plan for this reevaluation should be part of the Final Statement. You should further reflect in your plan a program whereby any changes in the TPCC will be reflected in the allowable cut the following year, rather than waiting until another 10-year plan is prepared. I would like to emphasize that the BLM should commit themselves to this approach and present the program as part of the final plan.

RECOMMENDATION II. Efforts to manage the "low intensity" lands should be A accelerated. The majority of the "low intensity" lands might be characterized as lands which can grow commercial timber but which the BLM feels it cannot regenerate successful in the perscribed time limits with current technology. Here again the O & C study indicated that on sites in adjoining areas other managers have developed successful formulas for managing the lands. Similarly, it appears that Josephine County is having regeneration and management success on similar sites in the Josephine Unit Area. It thus appears that the needed technology may exist to be successful on at least some of the sites. I would recommend that the BLM actively seek out this technology to be applied as soon as possible. Once proven, then those sites involved should be returned to the high intensity base.

Indeed the test program to yield 12 MM from the low intensity lands recognizes that some success is possible and the BLM is to be commended for this program. However, the program needs to be expanded and intensified and provisions in the Plan made to return the lands to the high intensity base.

I am particularly concerned that the program for low intensity lands does not plan for any planting and will depend on natural regeneration (pages 1-8 and 1-9). This policy should be closely examined and intensive regeneration practices planned for the area.

During the development of this plan it has become clear that forestry research oriented to the specific problems of southern Oregon is needed. It appears now that a research program to overcome these deficiencies is likely to develop in the coming months. North West Timber Association is completely supportive of this effort and commends the BLM for their efforts toward making it a reality. We would recommend that the final plan provide for adjusting the harvest level as soon as possible after research has provided the needed information, and it can be applied in the field. We are confident that the Medford BLM will move rapidly to apply the technology once it is identified or developed.

RECOMMENDATION III. Any reduction in harvest levels should be phased in. There is in the community of professional foresters a high level of confidence that, with research, money, manpower, and time the problems of the low intensity lands can be overcome. This would eventually result in an increase in the harvest level above the proposed level back to, or beyond the current level. If however, your proposed action is implemented a reduction in harvest will occur immediately and much suffering in the economy will result. A phase-in of any reduction would not only minimize the economic impact, but it will provide time to overcome the management problems such that the total reduction may not be required. A phase-in policy would be much more conductive to stabilizing the economy, an item that your economic analysis emphasized.

How a phase-in should be accomplished is a management decision requiring major analysis to determine how much of the inventory can be utilized without decreasing the sustained yield production of the unit. However, it would seem that a phase-in period of 20 years could be easily achieved.

I noted that within the unit (page 1-21) there are over 84,000 acres that contain stands in excess of 260 years where the growth rate is negative. It would seem that within the policy of managing the lands for the economic benefit of the local communities; and considering that the volume on these stands are decreasing, one could consider harvest of the stands even though it may take longer than five years to regenerate them!

The concept of a long term phase-in seems more feasible when one looks at Alternative No. 8, Continuation of Current Harvest Level, (page 8-87). Under this proposal, harvest levels could continue at current levels (146 MM) for 90 years at which time it would drop to a level only 7MM below the proposed level of 94MM. The problem of course is that you harvest the low intensity level lands and assume 116,000 acres would not be regenerated by the year 2060. I would not recommend that the economy take a 59MM reduction in harvest in the year 2060 anymore than I can accept a 40MM reduction in 1979. If one assumes that research will tell us how to successfully regenerate at least part of the 116,000 acres then there should be some point of balance between phasing in a reduction in harvest and risking some regeneration failure without lowering the long-run sustained yield.

I would recommend that the BLM examine a harvest plan using the following assumptions:

a) Continue harvest at current level for first decade.

b) Never allow harvest to drop below the "proposed action" level (floor).

c) Make high and low intensity lands available for harvest.

d) Beginning in decade two, allow harvest to drop at no more than five percent per decade.

Such an analysis would yield a point in time when the harvest would equal the proposed level, and at the same time would indicate what acreage is not regenerated.

This unregenerated land represents a risk, and not a fact, since research and technological development will continue and we very well may be able to regenerate the lands.

In phasing-in a reduction in harvest we are taking some risk of having unregenerated lands, but at the same time we are placing some faith in our research abilities and minimizing the economic impact.

RECOMMENDATIONS AND COMMENTS GENERAL TO THE DRAFT STATEMENT

Genetically Improved Planting Stock. Your plan indicated that you do not expect genetically superior planting stock to be available during the life of the Plan, and therefore it was not considered. This is an unfortunate situation and it is hoped that necessary programs will proceed so that such stock will be available in the needed volumes prior to the end of the 10-year plan period.

Benefits of Burning Slash (1-38). I would question your implication that the only benefit of slash burning is to make the site available for hand planting. Is burning beneficial in preparing a seed bed as well as controlling some types of competitions?

In chapter 3, you discuss the effect of slash burning and other management activities on the physical environment indicating it would increase the amount of carbon monoxide, oxides of nitrogen, etc. in the atmosphere. You did not, however, discuss the positive effect on the oxygen supply that will result by removing decadent old growth stands and replacing them with vigourous growing second growth stands. Such a statement should be included.

Spotted Owls. It is our understanding that you are implementing a new spotted owl policy. This policy is considerably different than your current policy and would affect considerably more than 440 acres. As I understand the planned policy, the entire Medford District would be required to provide habitate for some 14 owl pairs which would require special management reducing harvest on some 16,800 acres including 2,800 of old growth preserves. I realize there would be some distribution on the other master units; however, from Figure 2-15 a significant portion of the habitat could be in the Josephine Unit. Since this will be a significant impact beyond the draft statement I would suggest that you put out a supplement outlining the effect the new plicy will have on the proposed action. The public should have an opportunity to comment on the policy before the final statement is prepared.

Wilderness Values. It is obvious that some changes in your Final Statement will be necessary to reflect the congressional action which created the Wild Rogue Wilderness and removed the Mule Creek area from the Josephine Sustained Yield Unit land base. I would recommend that you clearly indicate in the final statement that congress recognized this action as an exception to the O & C act and that it does not represent a change in congressional intent regarding the use of O & C lands for wilderness.

Unauthorized Occupancy. You indicate that 72 cases of unauthorized occupancy exists and that you have problems with enough manpower to handle the backlog. It would appear that

you should develop a program to remove these individuals as soon as possible or open the sites for public use. Often times mining claims which are involved, make excellent camping and recreation sites. A program should be developed to remove the unauthorized occupants and develop the site, where appropriate, into recreation sites. To allow the sites to continue to be used as residence sites, with accompanying development, can only deteriorate the quality of the site for recreation which is not in the public's interest.

SOCIO-ECONOMIC ANALYSIS

Your staff is to be complimented on a fine effort in attempting to identify the economic impacts of the various actions. To see the O & C revenue situation depicted in terms of tax rate is a very meaningful approach. I believe, however, that there are some problems with the economic sections of the draft which should be corrected in the Final. Like many economic studies, one needs to be an economist to understand much of the draft. Each economic section should be summarized so that the layman can get a general idea of what is happening. In some cases you refer to graphs or tables which are either the wrong table or the figure does not exist, i.e., page 2-209 and the explanation of table 2-49. Also, the Table Of Contents for the entire draft is incorrect in numerous places.

Job Multipliers. One of the most important parts of any economic analysis relating to timber harvest levels is the jobs involved. Not just the jobs related to the harvest and manufacturing, but the community jobs created by the woods products workers spending their wages in the community to satisfy the needs of themselves and their family. This relationship was not clearly defined or emphasized in your statement. On the economic impact tables, such as the one on page 3-188, you show that the multiplier for indirect to direct jobs is something just over one. This seems extremely low compared to other studies I have reviewed for the area. If I understand your methodology correctly, your figure for indirect jobs assumes the average job outside of industry pays the same as jobs in the industry, which in reality is not correct. I would imagine that the average non-industry job in the area.

On page 2-201 you state, "It appears that for Josephine County, the timber industry contributes instability..." Certainly there are significant fluxuation in our industry due to housing starts, but this occurs above some base level. Since our industry contributes "instability" this implys that without our industry economy would be more stable--but stable at what level? Is it better to have a constantly depressed economy rather than one which fluxuated at some higher level?

On the same page you refer to the cylical nature of timber harvesting and conclude that "these extreme cyclical shifts far exceed the decrease expected to result from the proposed action." To me this statement indicated that the reader should not be as concerned with the drop in harvest level as with the cylical nature of the industry. I must disagree. If for example, in the first year of your new plan the market conditions were poor, then the reduced level of harvest might meet the requirements of industry; but if in year two, the market expanded then industry would expand production to capacity while other firms would go out of business. The effect to the community is still the same, fewer jobs will be available, timber receipts will be lower than if the

old cut were available and somewhere in the country some homes will go unbuilt. Regarding the multipliers used for logging and timber processing jobs (3-190), I cannot agree with Mr. Wall's approach (Appendix H) in which he assumes that labor/M will continue downward in a linear relationship. Much of the improvement in technology is moving away from strictly labor saving improvements and is aimed at better recovery. Based on jobs/M log scale, we may likely see a leveling off of the labor requirements in manufacturing. In the woods we might quite likely see increased labor requirements/M as we move to more second growth orientation with a reduction in average log size, more volume from thinnings, and increased labor requirements due to more environmentally sensitive contract requirements.

North West Timber Association appreciates the opportunity to commend on your draft statement and hopes that our view and suggestions will be helpful to you. The effect of your proposed action is not a pleasant one and we urge that you make every effort to develop a more economically acceptable plan within the constraints of sound forest management.

Sincerely,

Dennis Hayward

R. Dennis Hayward
Field Forester

pr

cc: George Francis, BLM, Medford

6

OREGON NATURAL HERITAGE PROGRAM
THE NATURE CONSERVANCY
1234 NW 25th AVENUE · PORTLAND OREGON 97210 · 503 228 9550

April 12, 1978

Mr. Murl W. Storms, State Director
Bureau of Land Management
P. O. Box 2965
Portland, Oregon 97208

RE: Review Josephine EIS

Dear Mr. Storms:

Due to the imminent publication of Eastern Oregon Natural Areas Data Summary, this office has not had time to prepare and submit a detailed review of this document. However, several points can be made.

Our files indicate several natural areas within the Josephine SYU. Information about these sites is available in the Inventory section of the Josephine County portion of the Western Oregon Data Summary, available at the BLM offices. The information in the inventory should be of use in considering Timber Management Plans.

Our files also indicate a wide range of rare and endangered plants in Josephine SYU. Your document indicates that you, too, are aware of the existence of these plants, but, in the absence of detailed locational information, have decided to ignore them. None of your proposed alternatives provide any kind of protection to these plants. I must take particular exception to the use of herbicides. These chemicals will at least impact these plants adversely, and have demonstrated adverse effects on humans and animal populations as well.

I refer you to the rare plant surveys conducted by the BLM in the Roseburg, Prineville, and Lakeview Districts. I urge that a study of the plants in Josephine SYU be conducted before any final Timber Management Plan is adopted. The other surveys provide acceptable models for such a study.

Sincerely yours,

M. Noreen Brown

M. Noreen Brown
Data Specialist

NB:1

Grants Pass, Oregon
April 10, 1978

8

State Director (911.1)
Bureau of Land Management,
P.O. Box 2965,
Portland, Oregon 97208

Dear Sirs:

The Shan Creek Grange #794 appreciates the Environmental Statement received and the proposal was discussed at length in regular session of the Grange.

Perhaps the greatest concern of the group is the proposal to use herbicide on the forests. We feel killing out the underbrush would deprive big game animals of their food since they depend on browse. It would take away their cover during hunting season even if they were able to survive. The same is true of a number of smaller animals and birds. We feel the use of herbicide would greatly deplete the wild life of the forest EVEN IF it were not poison.

You made some reference to underbrush coming back, but why kill it out unless you plan to keep it out?

Killing out the underbrush would also decrease soil moisture retention; contribute to greater runoff during storms; increase sliding or guttering of steep hillsides;and promote the clogging of streams with silt and dead brush. This would be sure to affect the aquatic environment and irrigation rights. Fertilization would also have an effect here.

The dead underbrush left after treatment with herbicide would be a great fire hazard. Couldn't this be a cause of major fires? Members who are experienced in fighting fires maintain

that the luxuriant grass that grows up in springtime where undergrowth has been destroyed, becomes brown by midsummer and is an even greater fire hazard than the underbrush could ever be. It seems to us that a great part of the fires on BLM land that get out of hand are those deliberately set to burn slash.

We feel elimination of the underbrush, by causing heavier run-off during the winter, would leave less water during the dry season when people with water rights need it most.

We, knowing the hazards of planting, wonder why you mention no unsuccessful planting. Do you have a rate of planting failure? What percent of a clear cut is not adequately restocked after five years? ten years? twenty years?

It has been our observation that trees unhindered by other growth tend to spread their roots instead of delving deeply for food and, being shallow rooted, are more likely to blow over in windstorms. They also tend to develop spreading branches at a lower height, thus cutting down on the quality of the timber.

We feel the recreation policy being set up in wilderness areas is very discriminatory. It deprives the elderly people who are unable to hike long distances from enjoying the forests. The same is true of young couples who are unable to carry in food, bedrolls and young children, so they are eliminated. That leaves only the young, unencumbered persons the freedom of the forests. We feel this policy becomes a greater invitation to crime.

We feel the permit system along the river is also discriminatory. The average working man does not have the freedom

to choose a date when he can use a permit very far in advance.

It will be a sad day if all vehicle access to the river be denied along the scenic portion except in parks. The aged, the infirm, and people with small children can no longer drive to the river and enjoy its natural state. A permit system is not the answer since driving a thirty mile round trip to Grants Pass for a permit before going one-fourth mile to the river would not be popular in our neighborhood.

We feel those who use the Federal land for grazing should adhere strictly to the number of animals allotted and that overgrazing should not be permitted. Overgrazing is as much a detriment to the forest as is the overharvesting of timber.

We approve sustained yield in logging, feeling it is a necessity. However, we feel many times new theories are put into wide practice without sufficient knowledge of what the results will be. A small mistake can be more easily rectified than a major one. Trials on a very small scale might eliminate more costly errors.

We discussed many other facets of the statement but these points were where we felt our "input" was more needed.

Yours truly,

Shan Creek Grange # 794

Mr. & Mrs. Hugh R. Haddock
5949 Riverbanks Rd.
Grants Pass, Oregon 97526

By Orpha Haddock
Orpha Haddock, Lecturer

By Hugh R. Haddock
Hugh R. Haddock, Legislative Chairman

CHEC
Cascade Holistic Economic Consultants
1604 N.E. 48th, Portland, Oregon 97213 (503) 287-8333

Forestry in the Public Interest
send reply to: see left

14 April 1978

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State Director (911.1)
Bureau of Land Management
P.O. Box 2965
Portland, Oregon 97208

Dear Sir:

Please include our letter of 3 August 1977 to George Francis in the record of responses to the Josephine timber management draft environmental impact statement. Please also include CHEC's memoranda to you dated 3 March, 30 June, and 19 August 1976. Together, these communications outline the criteria against which CHEC feels the draft EIS should be judged.

I am very disappointed that virtually none of the questions in the 3 August 1977 letter are answered in the DEIS. Considering the scope of the new proposals, such as fertilization and the two-stage shelterwood system, answers to these questions are vital if the public is to have a full understanding of the proposed action.

It is good to see that the EIS is including an alternative which allows no timber harvesting, as recommended in CHEC's 3 March 1976 memo. However, as described in that memo, the purpose of such an alternative is to provide baseline environmental data. Since no data regarding this alternative is presented in tables 8-2 or 8-4, this purpose is obstructed.

Without going into detail, it should be clear from the above mentioned communications that the Josephine DEIS is totally inadequate from a procedural and substantive viewpoint. The BLM apparently still does not take seriously CHEC's contention that an EIS can be a valuable part of the decision-making process. Until the Bureau does so it can expect that its plans will continue to be successfully appealed by citizens concerned with the quality of their environment.

Yours truly,

Randal O'Toole
Randal O'Toole
Staff Forester

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CHEC
Cascade Holistic Economic Consultants
1604 N.E. 48th, Portland, Oregon 97213 (503) 287-8333

Economic analyses in Forestry, Geology & Urban Development.
Randal O'Toole
John Savage
Michael James

3 August 1977

George Francis
BLM Medford District
310 West Sixth Street
Medford, Oregon 97501

Dear George:

These are CHEC's comments on the Josephine Master Unit allowable cut plan. We may have further comments later this month, and certainly will have further comments when the draft EIS is made available. However, this letter should illustrate most of our concerns.

Low Intensity Management Lands

The Bureau's reasoning for proposing to harvest twelve million board feet per year from some of the lands withdrawn from the allowable cut base is extremely weak. The proposal is to harvest the timber at a rate which would exhaust present inventory in a little over ninety years. Because experience has shown that artificial regeneration will generally fail on these lands, no attempt to artificially regenerate will be made.

While there is little data available at this time, my field experience and review of some office data the BLM has gathered leads me to speculate that the average regeneration period for these lands will be several decades. In order to justify any harvesting at all on these lands, the Bureau will need to that reforestation can be accomplished in shorter time periods.

Considering the site quality of the low intensity management lands, it is probable that culmination of mean annual increment occurs after ninety years, especially when no intensive management practices are applied. A program which harvests public timber at rates faster than growth at culmination and which makes no assumptions regarding reforestation success can only be called one thing: timber mining. As far as we know, there is no law preventing the BLM from harvesting this timber if there were a reasonable chance of reforestation -- even after several decades. But the Bureau does not even claim that there is such a chance.

If the Bureau truly wished to "experiment" with this 55,700 acres, it would be more credible if a smaller number of acres -- perhaps 50 to 100 -- were harvested each year, and if a variety of silvicultural techniques were used. This land roughly corresponds to the Forest Service Marginal category, and most national forests are assuming ten percent yields or less from their marginal land. The Bureau appears to be assuming over 100% yields.

One other disturbing aspect of the low intensity management lands is that only about half appear to have been identified on the ground. As you know, the Bureau was prompted by a Mason, Bruce and Girard study to reevaluate some of its plot classifications. This resulted in the 26,000 acres of identified low intensity management lands to be added to some thirty thousand acres of plot identified low intensity management lands.

In my OSPIRG report, "Timber Policies of the Bureau of Land Management in Western Oregon," I noted the difficulties the Bureau has had in trying to manage land when only one out of 1850 acres had been inventoried. Now the problem may be compounded for another ten years.

Basically, then, the problem is this: The BLM is proposing to harvest 55,700 acres of land of questionable fertility at rates far exceeding even flow -- and yet only 26,000 of those acres are identified in the field. In order to justify this action, the Bureau will have to provide far more documentation than is presently in the allowable cut plan.

Fertilization

The Bureau is proposing to fertilize 22,300 acres in the next decade, and to eventually fertilize some 164,000 acres on a regular basis. For each acre fertilized, a 22% growth gain is projected. Fertilization is expected to cost about $75 per acre, and each acre may be fertilized as often as every five to ten years.

At the public meeting in Grants Pass, several questions were raised regarding the validity of this program. Members of the public were assured that the 22% projected gain was based on careful research, at least some of which had been undertaken in Josephine County, and that the fertilization program had the approval of researchers at Oregon State University and the Pacific Northwest Forest and Range Experiment Station.

In fact, my review of BLM documents seems to indicate that neither of these assurances are true. The 22% seems to be largely a guess whose optimism is not substantiated by any research. It is, however, toned down from the 40% which the Bureau appears to have originally considered.

BLM memos reporting on the meetings with OSU and Experiment Station personnel reveal a widespread negativity towards the fertilization proposal. It was pointed out, for example, that most fertilization experimentation has been done on soils known to be low in nitrogen, whereas soils in Josephine County would not be expected to have nitrogen problems because the low rainfall would minimize leaching. At the same time it was feared that fertilization on dry sites would actually increase the soil moisture stress.

We must never again forget that the Medford District is not like northwestern Oregon. In order to justify the fertilization program, the Bureau is going to have to produce research on soils substantially similar to those proposed for this program. It should be kept in mind that the Forest Service has made a decision not to take allowable cut credit for fertilization, even in northwest Oregon, pending further research.

Discounting from Normal Yields

In its 1970 allowable cut plan, the Bureau discounted normal yield tables by 20% to account for rocky outcroppings, streams, and other "holes" in forest stands. In addition, a discount factor of roughly 12% was taken to account for defect and breakage. It is my understanding that these same factors were used for all of western Oregon.

In the 1977 allowable cut plan, a 27% discount factor is made because of a low measured stand density index. The defect and breakage discount has fallen to 2%, meaning that there is in fact a 2-3% gain in the new allowable cut plan.

Stand density index (SDI) does not measure "holes" in stands so much as it measures the inability of the soil to produce full yields because of moisture, toxicity, or other problems. Because western Oregon moisture and soil toxicity problems are largely confined to the Medford District, it may be anticipated that the SDI's of other Oregon districts will be closer to normal. But in those districts, it will still be valid to discount yields due to rocky outcroppings, streams, etc.

This leads to two questions about discounting from normal:
a) Can the BLM justify a twenty percent discount factor for "holes" in 1970 and a zero percent discount factor now; in other words, have all streams and outcroppings and other holes been identified in some other part of the planning process?
b) Can the BLM demonstrate that a 2% discount for defect and breakage is more accurate than the 12% used seven years ago?

These questions should be answered in the EIS.

Utilization Standard

Somewhere, some time, the decision was made to calculate the allowable cut with a cubic foot scale rather than a board foot scale. This is barely mentioned in the allowable cut plan, and must receive greater attention in the EIS. Questions to consider include:
a) What would the allowable cut be if the board foot scale were used?
b) Can the BLM satisfactorily demonstrate that the cubic foot scale will be a reliable measure of actual yields, especially considering that the current trend towards greater utilization may be mitigated by energy shortages?

Regeneration Lag

It is my opinion that a public agency should not presume a regeneration lag less than one which can be justified by actual field experience. Since the BLM has so little field experience with the cutting system it is now using, and since the experience with other methods has been notably poor, the Bureau should prudently use a long regeneration lag -- perhaps as long as ten years. When the results of William Stein's long-awaited reforestation study are made public, a shorter period may then be found to be justifiable.

Silvicultural Practices

The Bureau has practiced clearcutting and three-stage shelterwood cutting in the Medford District. Now the decision has been made to impose two-stage shelterwood cutting on much of the area. Admittedly, I am without the benefit of the Stein study, but my first impression is that reforestation on a site which has had 80% of the overstory removed will not be much easier than on a clearcut.

I have examined the Unit Resource Analysis, step four, and do not find it to be sufficient to justify present cutting methods on the District. I am sure that, if I examined the question carefully, I would quarrel with the silvicultural prescription in a fairly small number of cases. But it is not reasonable for the District to whole-heartedly endorse a cutting system -- two-stage shelterwoods -- on such a wide scale with so little experience.

Wildlife

Many of the measures taken to protect wildlife seem questionable. Since I am not a wildlife biologist I cannot discuss this subject at length. However, it is my understanding that a pair of spotted owls need between three and six hundred acres of old growth to survive and breed. The District is proposing to provide a total of 440 acres for the eleven known breeding pairs of spotted owls. This is surely not enough.

Economics

Economics is the allocation of scarce resources, and thus any land use or timber management plan is an economic plan. Just as we express wood volumes in cubic feet and board feet, so we express economic values in dollars and cents. A dollar and cent value can be placed on any resource which is scarce enough to make someone willing to pay for it. Certainly, there is no market system available to allow an easy estimate of some resource values, such as those for clean water, wilderness recreation, or spotted owls. But this does not mean that these resources are worthless, and in fact economists have developed methods to place a value on many of them.

It should be the job of the public land manager to maximise the present value of a long-term time stream of net benefits from the land. Achievement of this objective will also insure a quality environment -- to the extent that people are willing to pay for such an environment and not to an extent that environmental quality will cost society more than it will benefit society.

Economics, then, is a part of the human environment, and it is the obligation of a public land management agency to use economics as far as is possible to insure that present net benefits are maximized. For an example of just how much economic science has progressed beyond the use the land agencies are making of economics, I can refer you to The Economics of Natural Environments, a Resources for the Future Book by John Krutilla and Anthony Fisher.

In any case, economic analysis should play a large role in the EIS. A decision by the Bureau not to make such analysis a part of the EIS process will reduce the value of the environmental statement and may render it procedurally inadequate.

Land Use Plan

It is my understanding that the BLM does not regard a land use plan (or management framework plan) to be an "action," which explains why neither an environmental analysis record nor an EIS have been written for this plan. This is absurd. The EIS which is in preparation will not be adequate unless it considers the impact of the proposed land use plan as well as the impacts of alternative land use plans.

Herbicides

The Bureau's announcement that a draft environmental analysis record had been prepared for herbicide use in the Medford District seems to have been lost in the excitement over the allowable cut plan. A nine day period for public comment hardly seems adequate. Moreover, in light of the recent Federal Court decision regarding the environment impact statement for herbicide use on the Siuslaw National Forest, it seems incumbent upon the BLM to prepare an EIS for its western Oregon herbicide program before that program goes further. As District Manager, you should make a positive declaration regarding the need to prepare an environmental statement for this action.

Conclusion

Most of the statements here have been directed towards preparation of the environmental statement. Nearly all of the problems considered here can be solved if the Bureau can provide more documentation than I was able to find in my admittedly brief search.

In the absence of such documentation, it would appear that the proposed annual allowable cut should be reduced somewhat. I have estimated a rough, rock-bottom figure of seventy million board feet, including low intensity management lands:

Proposed Cut	93 mmbf
Low Intensity Cut	12 mmbf
Deduction for Fertilization	(6 mmbf)
90% Low Intensity Drop	(11 mmbf)
Wildlife Reduction	(1 mmbf minimum)
Remainder	87 mmbf
"Holes" and Defect	(10%)
10 year Regen. Lag	(10%)
Remainder	70 mmbf

We would welcome any comments on our analysis, and if we have any further ideas we will send them along.

Yours truly,

Randal O'Toole

Randal O'Toole
Staff Forester

THE ROBERT DOLLAR CO.

FOREST PRODUCTS DIVISION

TELEPHONES
Area Code 503
OFFICE: 832-2111 SALES: 832-2131
GLENDALE, OREGON 97442

HEAD OFFICE
311 CALIFORNIA STREET
SAN FRANCISCO 94104

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April 10, 1978

State Director
Bureau of Land Management
P. O. Box 2965
Portland, Oregon 97208

Dear Sir;

RE: Draft Environmental Statement
Josephine Sustained Yield Unit
Ten-Year Timber Management Plan

Our company and its affiliate GLENDALE PLYWOOD CO. employs approximately 350 people at Glendale, Oregon. We are heavily dependent upon United States Government timber and have been one of the largest consumers of Josephine SY U Timber.

THE ROBERT DOLLAR CO. appreciates the opportunity to comment on this document, and the continued opportunity we have had to participate in the formation of this plan. We compliment the BLM for its good job done in intensively gathering data and researching impacts. The completed plan should serve as good reference data for anyone needing timber-oriented information on Josephine County.

We would like to make the following comments on the plan:

1) Our basic disagreement with the plan is the TPCC and use of the results of the TPCC.

I personally am familiar with the Glendale area timberland and personally examined most of the controversially-classed logged areas prior to their being cut. From this experience I maintain that a good portion of the land classified low intensity management should be reclassified as high intensity.

Also from BLM field trips conducted on TPCC, I observed timbered areas classified low intensity because adjacent lands previously logged did not regenerate. In my opinion, this lack of reforestation is primarily the result of poor reforestation policy and effort, or silvicultural cutting method,not low site factors. It should be pointed out that these cutting and reforestation practices occurred prior to the present District Manager assuming responsibility at Medford.

The backbone of this plan is the TPCC; therefore, more work needs to be done to verify TPCC before implementing this plan and causing severe economic hardship in Josephine County.

2) Implementation of allowable cut should be phased in over at least ten years.

In my opinion, some lands classified as low intensity and limited management should be more productive than expected due to poor initial TPCC. The proof of this additional production will show in future inventories conducted 20 years from now and beyond.

If the allowable timber volume sold is reduced as this plan proposes, some mill or mills will be eliminated now and will not be in existance to harvest an increase in cut when it occurs 20 years from now after this TPCC mistake is proven. BLM should phase-in a cut reduction while verifying or testing TPCC and application of forestry techniques to low intensity and limited management lands.

3) This plan emphasizes regeneration immediately after harvest (pages 1-34, 35, 36) which is very important in avoiding future allowable cut reductions.

We must all make sure funding is maintained and utilized to establish reforestation after harvest operations.

4) Another criticism of the plan is timber land base erosion for visual management or Non TPCC reasons.

Land base erosion applies to this plan and the ever present small reductions that occur on a continuing basis between plans.

In my opinion, the visual buffer strips provided in table 1-9 (1300 acres) should be designated for harvest, using proper techniques that protect the visual resource. The BLM must show the public that it can harvest timber and maintain good estheic views too; after all the river is protected by the 1/4 mile (on each side) wild river designation.

5) Economic impact.

If this plan is put into effect, the 40 million board foot reduction in allowable timber harvest would seriously impact this company and its employees. Our Company requires 65 million board feet per year of logs to maintain our present employment. Reduction of harvest on this unit coupled with reduction in harvest from USFS lands - Kalmiopsis, Rare II, etc. can only spell serious problems or DISASTER.

Reduction has already taken place in the number of timber manufacturing plants in Josephine County. Look at Table 2-40, page 2-178. 1973-75; 33% of logs harvested flowed to Merlin. No logs flow to Merlin now. The log manufacturing company, Fiberboard, sold out to Miller Redwood Co. who eliminated the log manufacturing facilities.

Fiberboard also auctioned off SH&W in Grants Pass which serves as a reminder to us in the forest industry of what can happen in the ever tightening squeeze for raw material.

Thank you again for the opportunity to comment.

Please review carefully the reduction in harvest proposed, and consider "phase-in" to protect the economy of Josephine County.

Very truly yours,

THE ROBERT DOLLAR CO.

T. H. Mehl III

T. H. Mehl, III
Manager

THM/po

Herbert Lumber Company

Phone (Area Code 503), 874-2236
P. O. Box ~~122~~, RIDDLE, OREGON 97469
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April 13, 1978

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Mr. Murl Storms
State Director
Bureau of Land Management
P. O. Box 2965
Portland, Oregon 97208

SUBJECT: PROPOSED JOSEPHINE SUSTAINED YIELD UNIT T. M. PLAN

A drastic reduction in timber output is being proposed in the new ten-year management plan for the Josephine unit. If this plan is adopted I feel that very serious consequences will be felt in all of Douglas County, and most especially in the area south of Roseburg. Our economy in this area is almost completely dependent on the timber resources of the Umpqua National Forest and the B.L.M. administrated O & C lands.

In reviewing some of the comments of others regarding the timber productivity capability classification I feel that the proposed plan really is a "Kill Instead of Cure" attitude and is literally a cop-out instead of a solution to our problems. With stumpage prices at highs that recently would have been unbelievable and with the cost of wood products at astronomical levels, it would seem that a better effort could be made to increase the productivity of many of the areas the plan proposed to put into the "Low Intensity" classification. I feel that much more effort should be put into developing the needed technology to increase the output of these lands.

The socio-economic impact of a forty million board foot annual reduction in timber harvest is completely unacceptable to this area and would be nothing short of disastrous to the citizenry. We already have a higher than average rate of unemployment and everything possible should be done to keep the productivity of this area at a rate compatible with the needs of the people.

I believe a concerted review of the 112,000 acres proposed to be removed from the allowable cut base would reveal causes to keep some of that acreage in the productive land classification. It is hardly believable that fully one-third of the timber land previously considered to be productive should now be classified as unmanageable. Surely it would be good for present and future generations

if we would rise to the challenge presented in making these lower site lands produce useable wood fiber.

As a mill owner-operator who values the land and the welfare of my fellow citizens and who is appalled with the prospects of Southern Oregon becoming an economic desert I urge you to explore every possible solution to our common problem of timber land productivity.

Thank you for the opportunity to express some of my concerns and feelings, and I hope some revision of the proposed plan will be forthcoming.

Very truly yours,

HERBERT LUMBER COMPANY

Milton Herbert

Milton Herbert
Owner

MH:cah

U.S. ENVIRONMENTAL PROTECTION AGENCY
REGION X
1200 SIXTH AVENUE
SEATTLE, WASHINGTON 98101

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REPLY TO ATTN OF: M/S 623

APR 14 1978

Murl W. Storms
Oregon State Director
Bureau of Land Management
P. O. Box 2965
Portland, Oregon 97208

Dear Mr. Storms:

We have completed our review of your draft environmental statement for the Josephine Sustained Yield Unit Ten-Year Timber Management Plan. The statement adequately identifies and quantifies the major impacts to be expected as a result of the proposed plan. The decision to withdraw marginal areas from the land base used to calculate the allowable cut appears to be a wise one. We do believe the environmental statement should contain additional information about protective measures to be taken to protect water quality. We also feel the environmental statement could be usefully shortened by eliminating extensive discussion of insignificant impacts, concentrating instead on impacts expected to be significant and on means to minimize these impacts. Our specific comments follow.

There appears to be some cause for concern over the effect of management-induced sedimentation on water quality and aquatic habitat. In Chapter 3, site specific sedimentation problems resulting from yarding and loading and from road construction are identified as likely impacts. In addition, existing aquatic habitat is rated on page 2-82 as poor to fair, and is declining in quantity. In light of these facts, and considering the highly erodible soils on the unit and the significant recreational and fisheries values of the Rogue and Illinois river systems, we feel the environmental statement should provide a detailed discussion of site specific design features for timber harvest and road construction which will minimize sedimentation. For example, what stabilization techniques for cut and fill slopes and stream crossings, including timing, will be required with specific slope and soil conditions? What design features will be used to minimize stream encroachment by road fills? How will logging and yarding methods be specifically related to site conditions? The environmental statement should indicate what special provisions will be included in timber sale contracts to minimize sedimentation impacts. Will these measures be financed from BLM

funds or by contractors? This information is necessary to permit a clear understanding of the extent to which unacceptable impacts can be avoided.

The final statement should include some discussion of the downstream impacts on water and fisheries resources of the proposed plan in combination with land management activities of other agencies in the same watersheds. What will be the effect of increased peak flows on downstream channel stability?

In the discussion of alternatives in Chapter 8, no mention is made of mitigating measures for impacts on air, water, or soil resources.

The Timber Production capability classification is mentioned on pages 1-12, 13. The final statement should explain the relationship between the various categories and specific site conditions such as slope and soil conditions.

Problems with regeneration on both public and private land are alluded to on pages 1-102 and 8-83. The final statement should include a thorough discussion of the status of present efforts at artificial regeneration. Specifically, what is the basis of the assumption, used for computing the allowable cut, that regeneration can be accomplished within four years of harvest. Is it presently possible to guarantee complete regeneration?

Preparation of a separate environmental statement on BLM's western Oregon herbicide program is mentioned on page 1-96. The final environmental statement for the Josephine Timber Management Plan should state explicitly that no herbicide treatments shall take place until that separate herbicide environmental statement has been approved in final form. EPA will provide specific comments on the proposed herbicide program when the separate herbicide environmental statement is released. The discussion of herbicides in the present environmental statement does not provide adequate discussion of the chronic effects of phenoxy herbicides containing TCDD. Because of uncertainties about human health effects, 2,4,5-trichlorophenoxy acetic acid has been placed in RPAR status by EPA. (RPAR refers to Rebuttable Presumption Against Registration, a formal risk-benefit review within EPA's Registration Division).

In addition, Silvex and 2,4,-D is in pre-RPAR review. We suggest that the discussion on herbicides in this environmental statement be reduced to a brief description of the proposed program and a reference to the general herbicide environmental statement.

The Environmental Protection Agency's comments on this draft statement have been rated LO-2 (LO - Lack of Objections; 2 - Insufficient Information). This rating will be published in the Federal Register

in accordance with our responsibility to inform the public of our views on proposed Federal actions under Section 309 of the Clean Air Act, as amended.

Thank you for the opportunity to review this environmental statement. If you have questions or would like to discuss these comments, please feel free to contact me or Craig Partridge of my staff, at (206) 442-1595 or (FTS) 399-1595.

Sincerely,

Alexandra B. Smith

Alexandra B. Smith, Chief
Environmental Evaluation Branch

SUN STUDS, INC. | SUN VENEER DIV.

PHONE: GENERAL OFFICES 503-673-0141 • SALES 503-672-5059 • P. O. BOX 1127 • ROSEBURG, OREGON 97470

April 13, 1978

14

Mr. Murl Storms
State Director
Bureau of Land Management
P. O. Box 2965
Portland, Oregon 97208

Dear Mr. Storms:

Please incorporate this letter into the public input record for the Draft Environmental Impact Statement for the Josephine Sustained Yield Unit.

There are many parts of this massive document which deserve close scrutiny but which will get only passing comment from interested reviewers solely because of the limited time made available for review and comment. The B.L.M. surely must recognize that the sheer magnitude of reading and comprehending the document will discourage even the most interested public. I don't believe it is the B.L.M.'s purpose to discourage the public from expressing their views on the issues, but nevertheless that is exactly what has happened in this case.

The most significant impact of the proposed action will be the economic consequences of the reduced timber harvest. The 40MMBF drop in allowable cut will result in an immediate tightening of an already tight timber supply in Southern Oregon. This action occurs at a time when inflation is once again our nation's No. One economic concern and our President is calling for increased harvests from Federal Timber Lands. At a time when increased production of all scarce goods is the only holding measure against inflation we see the bureaucracy moving in just the opposite direction.

The proposed reduction in harvest is due primarily to the withdrawal of over 100,000 acres from the Commercial Forest Land base. This action should be closely scrutinized by an unbiased reviewing body that is sensitive to economic considerations. For example, one of the underlying reasons for the withdrawal was the fact that the regeneration of the site could not be assured within 5 years after harvest. The question that immediately comes to mind is where did the 5 year criteria come from? What would be the magnitude of land withdrawl if 6 years or 7 or even 10 years was used? If this land is not commercial forest land because it can't be regenerated in 5 years then what is it to be managed for i.e., what else is the land suited to? It would appear to me at the very outset that the 5 year constraint is completely arbitrary and should be

thoroughly reviewed before implementing the proposed action.

There is also considerable question concerning the accuracy of the T.P.C.C. as raised by Mason, Bruce & Girard. Before any action so drastic as that proposed is taken a thorough review again by an unbiased group should be made.

If after the above reviews it is still determined that the reduction in harvest is necessary it should be a phased in reduction not just an immediate fall down. Our industry is already in a difficult position because of shrinking timber supplies and the added shock of an immediate loss of another 40MMBF annually in our working area will undoubtedly result in the closure of additional mills.

Sincerely,

SUN STUDS, INC.

Robert E. Ragon
Timber Manager

RER:vf

cc: Senator Mark Hatfield
Senator Robert Packwood
Congressman Jim Weaver
Governor Robert Straub
Douglas County Commissioners

ROSEBURG LUMBER CO.

P.O. BOX 1088 · ROSEBURG, OREGON 97470 PHONE (503) 679-8741

ALLYN C. FORD
Vice President

April 14, 1978 15

Mr. Murl Storms, State Director
Bureau of Land Management
PO Box 2965
Portland, Oregon 97208

Dear Mr. Storms:

This letter is in response to your request for comment regarding the Josephine Sustained Yield Unit Ten Year Management Plan.

Roseburg Lumber Co. is a large wood products manufacturing operation, located in Southern Douglas County. The Josephine Master Unit has impact on our operation in the following ways:

1. Roseburg Lumber Co. buys a significant amount of government timber in the Southern Douglas County area.

2. A large amount of Company forest lands are located immediately adjacent to BLM lands in the Cow Creek area near Glendale.

In reviewing the plan, we are quite concerned about several items.

A. Withdrawal of Approximately 100,000 Acres from the Allowable Cut Base

In reviewing the document, it appears that the Agency has over reacted to the problems on these nonstocked lands. Obviously, these areas are not without their problems, but the technology does exist for getting these lands back into production based on reasonable cost benefit ratios.

This statement is based on experience in that our Company, in the Cow Creek area on similar type lands, has brought these lands back into a stocked situation. Obviously the productivity of the poorer site areas is lower but by the same token, it seems ridiculous to turn one's back on such a resource when technology is available.

B. Emphasis on the Shelterwood Timber Removal System

It has been our Company's experience in managing timber in the Cow Creek area that the shelterwood method has been a barrier in resolving the problems typical to the low site land in this region. Our reasoning is as follows:

1. There is a loss of growth between the initial and final regenerative cuts which you have shown in your allowable cut computations.

2. You are losing control of your lands during this period of conversion. It is almost impossible to effectively stop the invasion of brush and grass species which are the main barriers for achieving successful regeneration.

   This problem is shown on your picture in the Plan (page F-4). We have found that small clear cuts or strip clear cuts are by far the most effective in dealing with this problem.

C. Use of Herbicides

Your valuation of herbicide use is quite adequate but your recommended implementation of this crucial tool represents caution in the extreme. Obviously, the use of herbicides is something to be controlled very closely but your statement of application appears so rigid, it will not allow use of new developments or specific applications.

D. Stocking Low Sites

In reading the document, it is our interpretation that the BLM is advocating that the stocking of harsh sites should be accomplished naturally. This approach does not fit in with any established scientific method of regeneration. It has been scientifically proven that direct or natural seeding is the least dependable method of stand establishment, especially on harsh sites.

This problem is further emphasized with the recommended use of containerized stock on the back log areas. Containerized stock, with shallow root systems, is both intolerant to extreme climatic conditions and to the impact of herbicides used in grass control. It has been our experience based on much trial and error that large, hand planted 2-1 stock has been by far the most tolerant in such stress areas.

In general, the Plan is quite thorough in its detail and support documentation. Our chief concern is with the apparent lackadaisical attitude taken by the Agency in withdrawing such a large land acreage with known production capabilities.

Technology for these land conversions does exist. It is not a mystery. We would hope that the Agency would reconsider and act on available technology and experience.

If you have any questions or comments regarding any of these points, would you please contact me at your convenience.

Sincerely,

Roseburg Lumber Co.

Allyn C. Ford, Vice President

ACF/drw

C. C. D.
ECONOMIC IMPROVEMENT ASSOCIATION
COOS – CURRY – DOUGLAS

874 S. E. STEPHENS STREET
ROSEBURG, OREGON 97470
TELEPHONE (503) 672-6728

April 10, 1978

18

Mr. Murl Storms, State Director (911)
Bureau of Land Management
P. O. Box 2965
Portland, OR 97208

Dear Mr. Storms:

The CCD Economic Improvement Association is the U.S. Department of Commerce, Economic Development Administration-designated Economic Development District in Coos, Curry, and Douglas counties. Because the economic well-being of the District is affected by timber supply from the Josephine Sustained Yield Unit, CCD wishes to comment on the economic impact of the Josephine Timber Management Draft Environmental Statement (the Plan).

Whereas the Plan attempts to address the economic implications of its Proposed Action, a serious underestimation of secondary multiplier effects produces dubious conclusions about employment impacts in the area and in Douglas County in particular. While recognizing the limitations on precision in multiplier estimates, we are seriously concerned with the gross magnitude of the discrepancy.

Employment effects are underestimated for two reasons: 1) the Plan misapplies an income multiplier as though it were an employment multiplier, and 2) even as an income multiplier the Plan's figure is questionably low.

The Plan states that:

> to estimate {indirect employment} impacts . . . the "personal income multiplier" for lumber and wood products of 1.49 (weighted average for Josephine, Douglas, and Jackson Counties) {was} used to adjust direct employment impacts in each county (Social-Economic Data System, special tabulation, 4/18/77.) {emphasis added}

This procedure is incorrect because an income multiplier is not a tool for assessment of employment impacts, but rather for income impacts, as the name implies. To measure employment impacts, an employment or jobs multiplier must be used. The distinction is important. An income multiplier shows how much extra new income throughout the community would be generated per dollar of new income in the primary lumber and wood products (LWP) sector. However, this does not imply that new jobs in the primary sector necessarily produce new jobs in other sectors in the same proportions. In Douglas County, and Southwestern Oregon in general, average salary outside the LWP sector is substantially less than within. Therefore a dollar's worth of income represents more jobs in secondary employment than in the LWP sector. As a result, the job multiplier must be higher than the income multiplier.

How much higher depends on the relationship between incomes in the primary and secondary sectors. The May, 1977, Willamette University Douglas County Timber Supply Economic Impact Analysis by Beaton and Hibbard (pp. 7, 11) states the following:

> We deal with two different multipliers: 1) jobs multiplier, which estimates number of primary and secondary jobs created per primary job; 2) incomes multiplier, which estimates total dollar income generated in the County per dollar of payroll income in the lumber products industry. For reference, estimates for these timber-based multipliers are:
>
> Jobs Multiplier: 2.57
> Incomes Multiplier: 1.92
>
> . . . The job ratio is higher than the income ratio because the average income for secondary jobs is substantially lower than the average income in lumber and wood products.

Three sources give or directly imply both income multipliers and job multipliers. Where only one is given directly the other can be derived. The sources are:

a) Beaton and Hibbard, Douglas County Timber Supply Economic Impact Analysis; Willamette University, 1977.
b) Youmans, et. al., Douglas County, Oregon: Structure of a Timber Economy; Oregon State University, 1977.
c) Bell, Estimating Effect of Timber Harvesting Levels on Employment in Western United States; U.S. Forest Service, 1977.

Their estimates, directly stated or implied, are tabulated and explained in Table 1.

TABLE 1

DOUGLAS COUNTY INCOME AND JOB MULTIPLIER ESTIMATES

Source	Income Multiplier	Job Multiplier
Beaton & Hibbard	1.92[a]	2.57[a]
Youmans	1.75[b]	(2.25)
Bell	(1.89)	2.49[c]

[a]Beaton & Hibbard, p. 7.
[b]See Youmans; Table 4, p. 13, and Table 5, p. 31. Table 4 is a direct impact matrix. Table 5 is the corresponding direct-plus-indirect impact matrix.
[c]Bell, p. 6.

Source: The two figures in parentheses are derived quantities which depend on their horizontal counterparts, from which they are calculated, as stated above. The others are sourced as footnoted.

It is important for you to present employment impacts by using appropriate job multipliers. In the plan you used 1.43 as a job multiplier for Douglas County (Plan, pp. 3-202 and 3-203), and 1.49 for the three-county affected region. The base for your calculations was the 102 direct jobs lost in Douglas County's primary sector.

The following table correctly applies the Douglas County job multiplier of 2.57 (Beaton and Hibbard, the most recent research) for job impacts and corresponds those results to your misapplication of an inaccurate income multiplier. It extends the analysis to the three-county region, wherein the Douglas County job multiplier stands as a reasonable proxy for the correct Jackson and Josephine County multipliers.

TABLE 2

COMPARISON OF EMPLOYMENT ESTIMATES USING DIFFERENT VALUES FOR JOB MULTIPLIER

	Douglas County			Three-County Region		
	Multiplier	Douglas County Primary Jobs Lost	Douglas County Resultant Total Job Loss Estimate	Multiplier	3-County Primary Jobs Lost	3-County Resultant Total Job Loss Estimate
CCD (Beaton & Hibbard job multiplier)	2.57	102	262	2.57	227	583
BLM (incorrectly applied income multiplier)	1.43	102	146	1.49	227	338
BLM Job Loss Error (Under-estimated)			116			245

The BLM Draft Plan underestimates Douglas County job losses by 116 jobs and three-county regional losses by 245 jobs. The error constitutes a 44% underestimation of total job impact for Douglas County and a 42% underestimation for the region.

An error of this magnitude contributes to misinterpretation of the Proposed Action's impact and can lead to erroneous judgements in evaluating the Plan.

Therefore, to accurately inform the public, the Bureau of Land Management should reexamine the basis for derivation of its multipliers and the method of their application to correct the understatement of job impacts in the present Draft Plan.

Very truly yours,

G. Anthony Kuhn
G. Anthony Kuhn
Executive Director

GAK/ajw

CC: Representative Weaver
CCD Executive Committee
Douglas County Commissioners
Coos County Commissioners
Curry County Commissioners

DRJOHNSON LUMBER COMPANY

April 14, 1978

19

State Director
Bureau of Land Management
P O Box 2965
Portland, Oregon 97208

Dear Mr. Storm:

I found the draft statement on the Josephine unit of the Medford District to be unbiased and apparently straight forward in its presentation. I was pleased with the intensity of management anticipated on the high intensity lands and displeased with the proposed reduction of 40MM bd. ft. per year in timber sales.

I attended one of the "show-me" trips in which some of the low and high intensity lands were observed and the reasoning as to their classifications were expressed. I felt then, that a much too broad an area was being classified as one or the other type. It was obvious that there were areas of each type existing within a broad classification.

I do not believe the time period and man hour allocation for determining the TPCC of the unit was sufficient to arrive at a reasonable evaluation of the land's capability. A much greater intensity evaluation should be made and those areas capable of higher intensity production allocated as such.

There are substantial areas of private ground intermingled with the Bureau lands which are being managed for timber production, and in most cases successfully. Certainly some of the land owned by the companies would be classified as low intensity, yet they are stocked. Possibly a joint effort by both the Bureau and the private sector would produce some favorable solutions.

To remove the 112,000 acres from the cut seems too drastic a measure. Surely, the removal of dead and down timber could help ameliorate the proposed reduction. If only 350 bd. ft. were removed from the low intensity land per year per acre, the 40MM bd. ft. difference could be made up. Surely the annual loss in mortality in the 112,000 acres equals 350 bd. ft. per acre per year.

P. O. BOX 66 RIDDLE, OREGON 97469 TELEPHONE (503) 874-2231

DRJOHNSON LUMBER COMPANY

Mr. Storms
Page 2
April 14, 1978

As the technology increases and the feasability of managing the low intensity lands becomes more likely, I would hope a recalculation of the allowable cut would be made and an increase forth coming.

The economic impact of the 40MM bd. ft. loss is understated and vague in my opinion. A loss of 372 jobs if far short of what most likely will occur (approximately 700 jobs). The revenue loss will be substantially higher than than indicated also.

A 40MM bd. ft. reduction in cut is equivalent to the cut of Herbert Lumber 8MM, and C & D Lumber 32MM per year. These two mills employ approximately 300 employees. This does not include the woods help. So, directly affected by a reduction in cut are the approximate figures indicated above, and the supporting job losses will obviously be substantially above the 300.

Also, please consider that a 22% reduction in loss of jobs within this industry is projected over the next twenty years, and with the present land allocation and cut reductions on various government agencies, the loss is going to be far in excess of that which is projected.

If the northwest's timber industry is going to remain a viable industry, the government agencies selling timber are going to have to look towards more intensive management practices and land allocations <u>for</u> timber production, not removal from timber production. (The private sector also must make a strong effort to rehabilitate and manage their timber lands.)

To summarize, the areas of major concern are:

1. Classification of TPCC lands.
2. Salvage on low intensity lands.
3. High intensity forestry on all lands.
4. The actual economic impact of the 40MM bd. ft. reduction.

More time and consideration should be given to means in which the annual cut can be maintained or increased, not reduced.

Respectfully,

D. R. JOHNSON LUMBER COMPANY

Barry T. Taylor

Barry T. Taylor
Timber Manager

BTT/ps

P. O. BOX 66 RIDDLE, OREGON 97469 TELEPHONE (503) 874-2231

The Wilderness Society 2637 S.W. Water Ave., Portland, Oregon 97201 (503) 223-1067

April 20, 1978

20

Murl W. Storms
State Director
Bureau of Land Management
P.O. Box 2965
Portland, OR 97208

Dear Mr. Storms:

Just recently I talked with local environmental leaders about roadless areas surrounding the Wild Rogue River.

The Wilderness Society wants to go on record urging that the entire block of roadless lands be studied for possible wilderness designation.

Looking over the draft Timber Management Environmental Statement, it is very unclear just how many areas are roadless and are contiguous to the Wild Rogue. Your text just doesn't spell out the total roadless lands. Also, you don't indicate on your map very clearly where the roadless lands are. I would hope that when you publish the FEIS you draw onto the map the boundaries of the roadless areas.

Because the Wild Rogue is a nationally significant river, we are very concerned about the effects of logging and roadbuilding in the adjacent roadless lands.

We urge they remain undeveloped so as to continue a wilderness experience as one floats along the river.

Thank you.

Sincerely,

Joe Walicki

Joe Walicki
Northwest Representative

JW/ak

"THE ORGANIZATION OF SPIRITED PEOPLE WHO WILL FIGHT FOR THE FREEDOM OF THE WILDERNESS."
—Robert Marshall

Wildlife Management Institute

709 Wire Building, 1000 Vermont Ave., N.W., Washington, D.C. 20005 • 202/347-1774

April 20, 1978

21

Mr. Murl W. Storms
State Director
Bureau of Land Management
729 N.E. Oregon
P.O. Box 2965
Portland, Oregon 97208

Dear Mr. Storms:

The Wildlife Management Institute is pleased to comment on DRAFT JOSEPHINE TIMBER MANAGEMENT ENVIRONMENTAL STATEMENT, Bureau of Land Management, Oregon.

We have carefully reviewed the plan and are familiar with the area.

The plan is better than the North Umpqua Canyon Management Plan we reviewed in 1975; nevertheless it is unsatisfactory for wildlife.

It is basically an old growth liquidation plan. In the long run, nearly all the mature forest on high intensity lands will be converted to young forest (p. 1-29). Experimental cuttings on the low intensity lands indicate that these less productive lands will be harvested as soon as technology is available. The limited management lands are on fragile soils and the very factors that limit their productivity for trees also limit their productivity for wildlife.

The 440 acres of old growth retained near known spotted owl nests are not enough. We recommend at least 5% of the area of both high and low intensity lands should be retained in overmature timber. From acreages shown in Table 1-1, 11,000 acres in High Intensity lands and 2,800 acres in Low Intensity lands should be so classified.

We recognize that the basic laws are different for O and C lands. However, since the plan proposes "multiple use", this retention of old growth is necessary. Also, 11% of the unit is

DEDICATED TO WILDLIFE SINCE 1911

in public domain lands, subject to different laws. This ownership is, in itself, justification for true multiple use and wildlife habitat retention.

There are four major deficiencies in the plan for wildlife. We have already discussed inadequate provisions for old growth retention.

Snags and forage log retention are inadequate. The reliance and acquiesence to industrial safety regulations on snag removal will effectively eliminate snags from the area. Other agencies have aggressive programs to retain minimum snags. The BLM should do the same. Yarding of all unmerchantable material will remove forage logs needed for cavity birds. Some minimum numbers should be left.

Riparian zone management is not accomplished by leaving a vegetative strip of standard width; rather the width should be of such size to accomplish certain objectives. Harvesting dead, dying and cull trees from the riparian strip greatly reduces the value of this habitat for terrestrial wildlife. The intermittent streams receive no protection yet are important riparian areas for both fish and wildlife.

There is no discussion of fishery values. Spawning gravels are the most valuable land on the forest on a per-acre basis. Many studies have given usable values for production of anadromous fish. The final statement must include such material as part of a cost benefit ratio.

Some specific comments follow.

p. 1-30, par. 1. Thinning and control of brush will greatly reduce wildlife forage.

p. 1-33, par. 3. What are the protective measures to be used when yarding through streams?

p. 1-38, Gross Yarding. See our comments on forage logs.

p. 1-59. Why have there been no wildlife research projects?

p. 1-67. Most of the decisions on protection of other resources favor timber and are inadequate if wildlife is included as a major multiple use.

p. 1-94, 2nd par. While BLM did "consider" wildlife in the plan, the weight given wildlife in the decision is inadequate to protect wildlife habitat for all the citizens of the nation.

p. 2-82. Add a section on dollar values of fisheries.

p. 3-89. Include impacts of loss of forage logs.

p. 3-117. This is a good description of loss of wildlife habitat on High Intensity lands. It should also include the effects of increasing timber harvest on Low Intensity lands.

p. 7-2, 2nd par. Wildlife species dependent on old growth are more likely to die than to emigrate. Other habitat is nearly always at carrying capacity.

p. 8-1. All of the reasonable alternatives are unsatisfactory for a diverse wildlife population. Alternative 2, because it eliminates brush control, is somewhat less damaging.

More discussion of thermal cover requirements on winter range is needed, and provisions to include necessary cover included.

We hope consideration will be give to these suggestions. The O and C lands provide many opportunities for multiple use management. In this plan timber is still king, and only minimum consideration is given to wildlife.

These remarks have been coordinated with William B. Morse, the Institute's Western Representative.

Sincerely,

Daniel A. Poole

Daniel A. Poole
President

DAP:ejw

23

April 21, 1978

MEMO: To Merrill Storms
Director
Bureau of Land Management
P.O Box 2965
Portland Oregon 97208

From Dr. Paul J. Zinke
Dept. of Forestry & Conservation
145 Mulford Hall,
University of California
Berkeley, Ca. 94720

Re: COMMENTS ON THE ENVIRONMENTAL STUDY OF JOSEPHINE TIMBER MANAGEMENT PLAN.

The large reductions in allowable cut planned for the Josephine unit with the attendant loss in jobs and revenue to the Counties involved is a serious matter.

The impacts described in the environmental study on the economic and social environment of these counties are so severe that some amelioration is necessary. Any plan to withdraw acreage from the allowable cut base should be thoroughly reviewed. The loss of 370 jobs and more than three million dollars of revenue to the counties associated with a loss of 222,896 acres indicates that approx 600 acres of withdrawn land is equal to one job, and that each acre yields approx. $15 per year to the counties.

It is certain that acreage withdrawals should be carefu lly reviewed. I would advise that there be a review body set up that will assess the withdrawal of any land unit that is sizeable enough to yield a job. This review panel should consist of local concerned professional foresters, members of the public, working people in the area all of whom are affected by these withdrawals.

The spotted owl nest site reservation plans should also be carefully reviewed. Estimates of from 40 acres to 1200 acres of old growth timber needed for such reserves have been made. Where possible these should be confined to present reservations such as the Kalmiopsis Wilderness, and the Rogue River scenic corridor. At the most, each owl nest will cost two jobs, and more than $15,000 of revenue, a loss too serious to leave unchallenged!

April 19, 1978

24

BUREAU OF LAND MANAGEMENT
APR 24 10 00 AM '78
STATE
PORTLAND, OREGON

TO: Mr. Merle Stormes
State Director
Oregon State Office
Bureau of Land Management

Dear Sir:

I would like to enter into the record my objections to the Josephine Sustained Yield Unit Draft Environmental Statement(DES).

The scenario for the Future Forest (p1-29 to 1-30) under the plan is really bizarre. It is a frustrating example of people blinded by the profit motive, attempting to dominate nature at all cost. I find the idea of turning our beautiful forests into enormous factories to be totally repulsive.

In addition to these moral objections, I also have observed the following:

The DES does not follow the analysis of the impact of TCDD to its logical conclusion. By your own admission (pp 3-15, 3-58, 3-73, 5-9) some TCDD will enter the aquatic environment. By your own admission, (pp3-73, 3-140, 5-8, 6-3) bioaccumulation will occur in the food chain. By your own admission, (pp 3-41, 6-3) we do not know the effect of TCDD accumulation on animal life; the general feeling in the DES is, however, that if certain levels of pesticides do not cause death, then they must be O. K. BLM scientists have stated that TCDD is one of the deadliest molecules ever created by man.

The only justification you offer for ignoring these almost incredible facts is a long list of assumptions, suggestions, expectations, and hopes (pp 3-62, 3-63) that TCDD is not as persistent in the environment as scientific evidence, including your own reference, (p 3-62) would indicate. The use of TCDD and other toxic contaminants must be stopped!

Timber "Harvesting" practices have improved immensely in the last few years (thanks largely to the constant pressure from "environmentalists" and other concerned citizens). However, there are three areas of timber "harvesting" which seem to need further study.

First, it seems intuitively obvios that small streams whose temperature and/or turbidity are raised by the removal of their shading and bank protection will cause higher temperature and/or turbidity in the larger streams to which they are tributary. Unless and until this is disproved, I feel that <u>all</u> streams should have a <u>non-logged</u> buffer strip.

Second, I belive that the relationship between clear cutting and massive land movement should be determined before any more clear cutting occurs.

Third, Preliminary data from investigations of surface erosion rates conducted between Nov, 1977 and the present indicate that slash burning is the cause of greatly accelerated erosion rates on clearcut areas. As much as 20 tons/acre of soil (particle size less than 2 mm.) was lost from one burned 70% slope between Nov. 11, 1977 and Feb. 23, 1978. Unburned 70% slopes averaged approximately 2 tons/acre during the same period of time. If we are going to maintain a sustained yield forest, we need to maintain a sustained yield soil inventory. Soil formation, as you know, is a very slow process. I urge you to consider the significance of slash burning in respect to erosion rates and to eliminate this form of management altogether. Soil is not "America's Renewable Resource!"

There are two other items I would like to bring to your attention:

There are many people in th JSYU who are unemployed. The money saved by the federal government on unemployment compensation, food stamps, and welfare by putting some of the beneficiaries of these programs into the work force by using manual labor to remove unwanted brush would seem to make this method of brush disposal the most economical one available.

The last subject to which I would like to address myself is the vague manner in which you reported your water monitoring program. In relation to herbicide monitoring, for instance, you do not describe the method (if any) used to determine the most accurate times and sites for water sampling.

Taken as a whole, I feel that the DES follows the "letter of the law" but not the "spirit of the law".

Sincerely,
Malcolm Drake
Malcolm Drake
P. O. Box 1901
Grants Pass, Oregon 97526

Written Statement on the Draft Environmental Impact Statement for Timber Management, Medford District BLM by A. Winter

The EIS is designed to be an all inclusive document on the subject it addresses. Its objective is to evaluate all alternatives, arriving at a compromise that minimizes adverse impacts. As stated (1-64), "...no single objective or absolute policy guide for resolving conflicts (but)...multiple-use compromises (in order to) maximize public satisfaction." My additions to the Draft EIS may not satisfy the majority of the public, but I believe they will avoid many adverse impacts.

Low Intensity Lands and the Allowable Cut

Too much timber is proposed for cutting on low intensity lands to merely satisfy the needs of experimentation. It appears that these 12 mm. bd. ft. were added to soften the reduction in the allowable cut. If the BLM takes the problems of these areas seriously then this amount should be reduced by 90%.

"All provisions of applicable Federal and State law will be adhered to" (1-4). I suggest the addition of Local-County law to this sentence.

Research should be done on the old-growth eco-system prior to its being phased out. At the very least BLM should immediately begin this project with hopes that results will be completed within 10 years. Areas where old-growth is gone should be explored and data compiled to determine long range effects of eliminating such a large percentage of ancient forest.

It is a contradiction to state "...man and his machines will be present more frequently...(yet) less impact on the site because of smaller trees(and equipment)"(1-30). I would like the BLM to prove this statement.

Is the stocking density accurate? A 20% allowance for "holes" in the previous AC is now 0%, 13% defect breakage derived at by previous research is now only 2%. The loss of these percentages makes the proposed AC base more than the present one.

What was the reasoning behind the change from three-stage shelterwood to two-stage? My concern is for the decline in the

relative humidity after so much crown cover removal. "This would...dessicate herbaceous vegetation"(3-5)probably making a permanent change in the eco-system.

Clear cuts are planned only in areas of over 80" of rain. These areas are often very steep. My concern is for the erosion this may cause.

Reforestation

Some important aspects have been omitted in the BLM's calculations of success through reforestation. The growth of stocking must be checked as well as the number of trees to assure us that healthy growth is being made. Seedlings should also be counted after the final cut, especially on steep slopes where their losses will be more that the moderate number allotted.In addition, reforestation attempts should continue on low intensity lands that were timber mined in the past.

Chipping and manual site preparation are not mentioned at all in Table 1-1. Each have their place.

Herbicides

BLM cannot defend a program that involves as many unknowns as they insist upon regarding herbicides. There is much documented evidence already in Appendix L of the Draft EIS and in the bibliography of the Final EIS for the Forest Service, Region 6, Herbicide Program, as well as the reference sheet at the end of this paper, to the effect that phenoxy residues;

(1) do bioaccumulate(Taylor, Matsumura, EPA, Florida S.U.)

(2) do move through the soil via leaching (Norris, EPA).

(3) do cause mutations (Yoder, Ragman, Streisinger, HEW).

(4) are toxic in lower than measurable amounts (Cortney, Streisinger).

(5) does drift as far as 1500 miles (HEW, Knight).

(6) and that no statistically significant survey exists (Streisinger).

In addition, the BLM ignores proceedings going on right now with an eventual ban likely by EPA of 2,4,5-T, 2,4,5-TP, 2,4-D and Picloram.

The EIS states (5-2), "...since the increased pollution would disperse on unpopulated areas, these amounts are of minor significance." As a resident of "these unpopulated areas",

I object to being a part of this experiment. You will too when these chemicals start appearing in measurable quantities in your food, air and water.

Fertilization

There has been virtually no research done in the JSY Unit on fertilization. The findings used in Table 3-11 are meaningless because they came from an area where rainfall is considerably higher and the summer drought shorter. The bulk of the JSY Unit is quite arid and douglas fir is already under moisture stress. Stimulating plants with nitrogen will only increase this. It is moisture, not nitrogen, that is the lacking ingredient in local forests. This would be apparent if simple soil tests were taken. Perhaps the program should substitute water for urea.

"Little is known about the effect of nitrogen on recylcing rates of other nutrients in forest soils (3-35)." Perhaps a conclusion should be reached concerning this before a full-scale program is launched, with a dependent AC base attached.

What of the run-off of nitrogen into streams?

Research

Research seems to be one item on low priority throughout the planning process. It seems that it is done while the actual procedures are going on instead of prior to them. Research projects need to be undertaken on the subject of low intensity forest management, on soil, water and old growth as separate resources, on madrone as a succession tree integral to a healthy coniferous forest and in many other areas. There are many fully capable specialists within the Medford District who can take data to keep research happening in all these areas.

Wilderness

The Zane Gray Wilderness Study Area should be expanded to its full potential 52,000 acres, mostly low intenisty lands. Whiskey Creek has 6,800 acres classifiable as roadless and most of these also do not have to be removed from the AC base. Wilderness Study Areas should be initiated even in roadless areas that are not large enough to be acceptable by the usual criteria(FLPMA). One of these is Grayback Glades which stands out as a sentinel 20 miles to the east and north of 7,000' Grayback Peak as a huge "7".

Wildlife

An objection must be made whenever the BLM takes the minimum, expedient course to resolve an issue. For instance, in Table 1-10, Issue VIII, the proper solution would be to maximize an opportunity to help wildlife through seeding roadsides. This might also result in more jobs and less erosion.

Negotiations must be made with the Oregon Department of Forestry to settle the issue of removal of snags and dead trees. Most insects have already moved on by the time a dead tree is removed, therefore nothing is solved. Yet to leave the occasional snag would assure us that a healthy population of cavity nesters exists in every area, doing their job of forest sanitation.

Spraying meadow areas with herbicides where deer forage would be risky. Why not take these acres out of the timber base?

Roads

Provisions(1-34) for restorations of rock pits should include ones previously used and now a visible scar to the environment (e.g. the one off East Fork Rd. in Williams).

Erosion of 175,000 tons of top soil(3-31) seems like a major impact. There is insufficient discussion of the impacts of this on sedimentation and regeneration in the EIS."Sedimentation has localized significance (p. 3-70 & Table 3-12)" but it is still an impact to the environment.

Discussion is needed in the areas of new roads bringing in more hunters and bikers. I suggest that all new roads should be kept closed to lessen advese impacts to wildlife and soils.

Recreation

Hiking would increase if herbicides were not used because most hikers are environmentalists and would not hike in sprayed areas. Use of herbicides would also limit berry-picking and would adversely effect the pickers.

3-156 states that new roads would give "easier access to trails." What trails? BLM maintains only one trail in the entire district.

Visual Resource

I question the assumption (8-31) that visual variety decreases when desired vegetation cannot develope. I believe just the

opposite is true. Sprays would also increase adverse visual impacts with dead brush and trees to hike through or view from roads.

Clearcuts must be healed.

Grayback Glades should be Class I, as all prominent peaks and ridges are, not Class III.

Air Quality

What about the contributions of mill smoke to the figures for slash burning?

Smoke dispersal conditions don't exist very often in the Rogue Valley even during the winter.

What of the additions of herbicide drift into the air of residents?

Socio-Economic

Without undue cost or time, the BLM could help satisfy its program of public involvement by including a provision for informing landowners of timber sales adjacent to them. The knowledge of the vicinity plus personal impacts would more fully develope the planning process. You have ignored my letter, dated August 29, 1977, regarding the AC base in which I stated, "(these landowners') water quality and privacy should be respected....Most of BLM's neighbors are rapidly becoming more familiar with good timber management."

I don't believe that enough additional jobs are noted that would be created by the extensive reforestation program proposed. Reforestation jobs might become more stable than mill work. Professional reforesters would thin and water in summer, plant in fall and spring and clear brush in the winter. Research would determine how many more jobs would be created. Also, because of a reduced timber supply, mills would not continue to automate thereby offsetting the loss of some jobs.

Buffer Zones

200 foot buffer strips were planned for Class I and II streams throughout the planning process memos, yet why they were severely reduced is not stated. Table 1-10, Issue VI, shows an opportunity missed to make up for past stream degredation with sizeable buffers also including intermittent streams(3-58).

Conclusion

"Increases in allowable harvests based on intensified management practices...should be made only upon demonstration that such practices justify (them) and...that such practices are satisfactorily funded for continuation to completion(1-3)." The number of unknowns referred to regarding fertilization, the compromises already made regarding genetically improved stocking, the lack of proven research negating the harm of herbicides, the instability of the present economy; all these outline an excessively hopeful picture of the future of the proposed plan. Waiting for the results of research that may not even apply may result in a failure not fully grasped for fifty years, when it will be too late for the forest. A better policy would be closer to alternative #2 and nothing should be added to the AC base if it is based on unproven silvicultural techniques. Some small scale experimenting is allowable for research but not on the scale that the BLM proposes. I reccommend a maximum allowable cut of 70 mm. bd. ft. including 1 mm. bd. ft. from low intensity lands.

Alan Winter

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Headwaters Association imput on the Josephine Sustained Yield unit ten year Timber Management Plan, Draft Environmental Statement

I. Questions about commercial forest land.

A. Apparently nearly all species of hardwood will be eradicated by the herbicide program. Also, all replanting is apparently to be Douglas fir. Essentially, this is monoculture. The DEIS does not discuss what the consequences of an experimentation of this magnitude with the prime resources of the region will be.

B. How much yearly income has the government gained from timber sales for the past ten years in the Medford District? How much has been spent on reforestation yearly for the past ten years? How much on timber sales? What are the projected answers to these questions for the next decade?

II. Alternatives.

A. To commercial forestland use:
Research natural areas--it is significant that only 5 more decades of old growth exist on Medford District BLM lands.
In light of this fact, it seems important to evaluate in what ways the Medford District BLM could fill the missing links in research natural area needs as described and listed in Research Natural Area Needs in the Pacific Northwest, USDA Forest Service General Technical Report PNW 38, 1975, Pacific Northwest Forest and Range Experiment Station.

B. To Herbicide use:
An issue not addressed in the DEIS which deserves attention is the possibility of utilization and marketing of woods classified as non-commercial. Headwaters has made limited inquiries into the salability of black oak, madrone, maple, and alder; we find that due to increasing rise in the price of Eastern hardwoods, the Western hardwood market is steadily expanding. This DEIS violates NEPA if it lacks a complete discussion of the possibility of marketing hardwoods, including a discussion of the possibility of working with SBA in assisting the local residents in establishing hardwood mills and kilns for processing this lumber. In particular, the very small mills which are being seriously hurt by competition due to the decrease in softwood supply could use assistance and redirection.

III. Impacts:

A. Water--

There is considerable ambiguity in the DEIS regarding exactly which bodies of water will be protected. Pages

363 and 364 refer to "all flowing streams, bodies of water, and marshes". Table I-9 calls for undisturbed buffers on major perennial streams.

An Outline of Forest Hydrology by Hewlett and Nutter defines perennial flow as that which persists almost throughout the year in a well-defined channel. Intermitten flow is defined as flow which generally occurs only during the wet season.

Does the BLM recognize these definitions? If so, why does the BLM not give protection to intermitten streams when there are three per mile of road on BLM land? (p. 1-33)

Water does flow downhill -- since the DEIS admits that herbicides do get into water and does accumulate in bottom sediment, why have you equivocated about affording maximum protection to all streams and springs?

B. Socio-economic--

Herbicides are increasingly seen as a cheap and easy panacea (no thinking, just spraying) to fill the gap caused by 30 to 40 years of overcutting by all government agencies as well as private industry. As usual, the government shirks its responsibility for creating an inflated Allowable Cut and the desperate reforestation problems that exist. Instead, local citizens will bear the burden of government mistakes and industry greed not only in a reduced softwood economy, but also because of the dangers to health and the environment AS A RESULT OF HERBICIDES. The current DEIS pays lip service to these impacts.

Water: The DEIS makes no reference to impact on adjacent and downstream landowners except to say that a water monitoring program will take place. This obviously needs to be a serious committment on the part of the BLM because of the O&C pattern of ownership. Is the 100' buffer strip enough? The DEIS admits that it isn't always enough.

"Undetectable" and "very low" are key words in the discussion of affects of herbicides on water systems. (see DEIS pp3-57thru3-64)

In fact, there are no safe levels of dioxin pollution. According to Dr. Wilbur McNulty of the Oregon Regional Primate Center in Beaverton, phenoxy herbicides are toxic in "undetectable" levels. The DEIS doesn't mention this important fact; another example of BLM covering up what it doesn't want the public to know.

If there is an accident and herbicides do pollute water supplies, in what ways will the BLM be responsible to the afflicted citizens? Will you provide alternate drinking water? Or will you just apologize feebly and walk off?

Wildlife: Uner long-term impacts, the DEIS states that "most animals will accumulate TCDD in certain body tissues."

Of course, the DEIS focuses on the wrong issues again. It is not likely that a creature will ingest a lethal does, you say; therefore, everything is fine. The issue is that many animals which have ingested TCDD will be hunted and eaten. Will you provide a monitoring service for fatty tissue in game?

This brings up another issue. The DEIS states that TCDD degrades in one day. It also indicates that detectable amounts can be found for 10 days after treatment in the environment. Which of these figures is correct? Are there other figures that weren't mentioned in the DEIS?

Employment: Many of the citizens of the Medford District live in households where an appreciable component of family income is from forest-related jobs, including direct full-or-part-time employment by forest agencies of the government, participating in tree-planting/forest management private cooperatives, involvement in CETA jobs in cooperation with governmental forestry programs, or private forestry enterprise. Citizens are affected adversely by the BLM's herbicide plans in 1) direct employment contact with spraying, 2) loss of income because of the choice of low-labor intensive management techniques rather than high-labor intensive alternatives. In addition, government monies will be spent elsewhere for chemicals and application equipment, where such monies will not circulate in the local economy and benefit retail establishments.

In 1975 Headwaters brought suit against the 1976 Fiscal Year Plan. Part of the BLM defense included the following discussion of the impacts of the Headwaters action on the local economy. (Appendix A):

> "4500 jobs in the wood products and timber manufacturing industries (are created by Medford allowable cut). Several small communities such as Glendale, Merlin, Murphy and Kerby, located in Josephine County, are entirely dependent on income from wood products industries supplied primarily by BLM timber. Mills in these areas are dependent upon a continuing supply of timber from BLM sales. Without BLM timber such mills may be forced to close their mill doors permanently. In view of the keen competition for timber, the recruiting of skilled personnel, retooling and reestablishing or restoring marketing areas for their products, the task would be too overwhelming for them to compete again successfully. Loss of their primary source of income would cause inhabitants of these communities to either relocate, if they could afford to do so, or look to local welfare agencies for support.

The tone of this statement is nothing short of desperate. The Headwaters suit would have resulted in a 30% reduction in timber supply approximately 3 years after THE SUIT WAS FILED; the current AC reduction

will have the same short-term impact. Yet, the discussion in the DEIS of the impact is substantially different. Why the difference? Which is true?

IV Summary.

The BLM, in combination with the Forest Service, the State, the County, and private industry plan to dump massive amounts of herbicides on the local environment. We submit that the EIS will be incomplete without a discussion that addresses itself to the impacts of all the herbicides used by all these agencies, as these have additive and synergistic effects.

Chapter 5 of the DEIS, "Adverse Impacts that Cannot Be Avoided", could be almost entirely eliminated if all herbicides were removed from the 10 year agenda. Since the potential harm to health and the environment is irrevocable and since the BLM has not seriously investigated alternatives, we submit that this DEIS is inadequate.

Paula Downing

Paula Downing, for Headwaters
April 21, 1978

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April 24, 1978

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Mr. Murl Storm, State Director
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PO Box 2965
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Dear Murl:

This is in response to your request for comments on the draft environmental statement for the Josephine Sustained Yield Unit 10-year timber management plan. We have done our best to review this 834-page document in the 35 days since we received the report. Obviously, our response will have to be brief and in broad terms. Please do not mistake our brevity for a lack of great concern about the significant impacts that will occur as a result of your proposal.

First, we want you to know that we appreciate the good assistance all of your Bureau of Land Management people have given to keep us involved in this important planning process. This effort on your part has given us sufficient understanding of the proposed plan so that we can make meaningful comments and so that we can make workable suggestions for changes to make it a better plan.

As stated to you in oral testimony, our Association is very disappointed and we seriously question whether you have developed a proposal that is best for all concerned. Two broad areas of our concern will be discussed: the <u>mismanagement</u> of the past and the <u>misinformation</u> about the future <u>possibilities</u>.

The past mismanagement or lack of management on the Josephine Sustained Yield Unit has resulted in a substantial loss of land and a loss of timber growth. Your staff alerted us to these problems as revealed in the Timber Productivity Capability Classifications. Our Association retained the consulting forestry firm of Mason, Bruce and Girard who put together a team of experts on forest soils and regeneration. Their report was submitted to you and discussed at length. We are somewhat amazed that this voluminous environmental statement, and its over 250 literature citations, fails to make any mention of that report. We ask that this report be included in the Final Environmental Statement as a part of our Association's response to your proposal.

Did you reject the findings and recommendations of that report? If not, to what extent were the results used in your proposal? We thought the report contained constructive suggestions.

In regard to lands withdrawn for regeneration reasons, we believe that your proposal tends to give up too easily. In our opinion those lands are the ones deserving to be classed for "high intensity" management, rather than "low intensity" or "limited" management. At least some of the cause of the failures in the past have been due to an attitude of defeat held by those responsible for regeneration following harvest. Forest land is scarce and no more is being made. We believe that special care and attention can and will return many of these withdrawn lands to productivity. We would like to see your proposal exhibit this same confidence in the form of a stronger action program of restoration of these to the timber land base.

Regarding past management, we are also deeply concerned with the poor performance of other intensive forestry practices. We have consistently supported the full allocation of all the funds needed to apply known practices promptly to all the available opportunities. Certainly the upward trend in stumpage prices has continued to economically justify all those practices which we were told were justified at the time of the 1971 plan.

Another management shortcoming has been a failure to capture a larger share of the mortality occurring in the older stands. On page 1-21 we note that in all those acres over 250 years of age (84,243 acres, over one-third of the area) the annual volume losses are substantial. While this is somewhat to be expected in these old stands, our concern arises over the fact that most of these same stands were showing positive net growth at the beginning of the 1971 plan period. This means that the rate of mortality is increasing. Your own data indicates that the net losses on this one-third of the area are 35 times greater than in 1970 -- about 0.2 cubic feet per acre per year in 1970 versus 7.65 cubic feet per acre per year in 1976.

We believe your proposal should be revised to give the public complete assurance that the failures and shortcomings of past management will be corrected and/or eliminated under the new management plan. This means you will need 1) a high intensity effort for regeneration on the withdrawn lands rather than low or limited management, 2) full intensity of application on all lands of the known, practical forestry programs at a level equal to the best of any other forest land managers, and 3) a much greater effort to capture the large growth losses apparently taking place in the older stands.

Also in regard to growth, our review of the growth and yield data has given us cause for considerable concern. The table on page 1-21 shows yields per acre and growth rates that are very critical to the harvest level, particularly under your non-declining flow calculations. Our forestry advisors tell us that the procedures used tend to result in conservative yield estimates. We believe that such a critical factor needs to be thoroughly examined and understood by us. Therefore, we are going to have a thorough study made using your data as well as other related information. We will report to you by June 5, 1978.

We believe the draft statement contains misinformation and lacks important information in several respects. Our Association people have noted some of these and we also asked our consultant and county foresters to take note of these shortcomings. We can only mention some examples in this response.

Table 3-19 on page 3-188 lacks clarity and is misleading. The comparison of long-term timber harvests from Josephine Sustained Yield Unit under current and proposed management indicates an increase from 87 to 94 MMBF per year. Careful examination for the source of the 87 MMBF indicates it came from Alternative No. 8 on page 8-87, wherein we see that the cut of 146 MMBF would continue for 90 years before declining to 87 MMBF. Yet the comparison on 3-188 leads the reader to believe that "long-term" is based on planned harvest during the second decade (footnote 1) rather than 90 years hence. The effect of this is to mislead the reader with an array of plus percentages in favor of the proposal as shown in the last column. These pluses do not occur until 90 years from now. In fact, over the entire 400 year period the current management will produce 7 percent more than the proposal, 39.1 billion board feet versus 37.6 billion board feet. And in the second decade (your long-term) the current management produces 146 MMBF per year rather than the 94 MMBF of the proposal, or 55 percent more.

In this example we do not intend to imply that we support Alternative 8 which would fail to regenerate 116,000 acres after harvest. But isn't it rather ridiculous to present such an alternative to the public and to label it current management? Does current management actually intend to continue with past failures to regenerate, even on the difficult areas?

On the positive side, this gives us considerable evidence to believe that a viable alternative exists, but was not examined, in which a harvest of somewhat less than 146 MMBF per year could be sustained for, say 30 years, followed by a sustained level of 94 MMBF per year forever. The Oregon Board of

Forestry study and the Beuter study indicate, and our consultant assures us, such an alternative is possible without sacrificing the other multiple uses and resource protection objectives of your proposal.

One of the possible benefits of such an alternative would be the capture of volume that will be lost due to your proposed plan under strict non-declining flow. We do not believe that the sustained yield concept under the law was intended to be so strictly interpreted and rigidly applied. On the other hand, we do not advocate abandoning an objective of even-flow without good reason. We think the serious situation on the Josephine Unit requires analysis of the benefits possible from reasonable planned deviations from even-flow.

Along these same lines we are concerned about the development and analysis of Alternative No. 5. This seems to be highly constrained and was not developed nor tested in the spirit of the Oregon State Department of Forestry proposal. The Forestry Program for Oregon properly examined the possibility of maintaining the total harvest of timber from all the forest ownerships in southwest Oregon, now and forever. Our understanding of that Program was that Bureau of Land Management lands would be asked to produce additional output for four decades, then to decline when other owners had developed harvestable volumes, then to rise again to a long term high level of output. Based on the Bureau of Land Management's own acreage devoted to timber and their yield levels, the Beuter study and subsequent further analysis by the Board of Forestry indicated this could be done and that the long run average sustained yield of the Bureau of Land Management lands would not be impaired.

Your Alternative No. 5 seems to have doomed itself to failure by scheduling four decades of harvest as specified in the Program of Forestry, then returning to a rigid even-flow schedule. As a layman I cannot believe that the Josephine Sustained Yield Unit timeber productive base of 229,310 acres could never return in 400 years to a sustained yield level of 94 MMBF per year after 40 years of cutting only 880 MMBF more than scheduled in the proposed plan.

We recommend that you obtain from the Oregon Board of Forestry the details of their projections which indicated that the Program of Forestry objectives could be met. Based on your examination of those results we would like to see your analysis and conclusions as to whether the Program objectives could be met.

There is a general tendency for the draft statement to tone-down or soft-pedal the expected impacts of the proposed large reduction in timber harvest. This is done in several disturbing ways.

For example, the report relates a six percent decline in employment under the proposal to an eleven percent year-to-year variation. The implication is that a six percent decline forever is less important than, and therefore better than, the eleven percent fluctuation of year to year. These are separate problems, each one serious in its own right.

In other places the tendency is to relate declines in employment due to the proposal to the offsetting gains in forest development jobs. Our interest lies in obtaining the forest development jobs <u>and</u> preserving the forest products jobs.

In still other places, the reductions expected in stumpage revenue are related to offsetting expected price increases. Are we to understand that still further decreases in harvest might be welcomed if stumpage prices were driven up proportionately? While we are concerned with stumpage revenue we are more concerned with maintaining the overall economic strength of southwest Oregon by supplying economical raw material to our industry.

At one place the report cites long term favorable impacts on wood supply, housing costs, etc., that are not expected to occur until 90 years from now under the proposal versus the hypothetical Alternative No. 8.

In these and numerous other instances we get the impression that the Bureau of Land Management is trying to make the shock of this proposal appear to be less than it really will be. The procedure of comparing other alternatives with the proposal rather than with the recent past conditions also tends to reduce the negative impacts of the proposal.

The overall effect of this is to reduce the public's concern for the need to develop other alternatives that would mitigate the undesirable economic impacts. Our Association believes that such other alternatives do exist. These would be something more than what is in Alternative 4 but more realistic than the hypothetical treatment given to Alternatives 5 and 8. We ask that you examine these possibilities before making a final decision. In the meantime we intend to develop one or more of our own detailed alternatives to recommend to you. This will be done with the help of our consultants and also submitted to you by June 5, 1978. We will certainly appreciate your cooperation in helping our consultants.

We will be happy to discuss our suggestions with you and your staff at any time. Hopefully, you will be able and willing to give full consideration to our supplemental reports on growth and other alternatives.

Sincerely,

George

George Calvert
President
Association of O & C Counties

GC:mh

INDUSTRIAL FORESTRY ASSOCIATION

SERVING FOREST OWNERS, LOGGERS, WOOD USERS
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April 24, 1978

Bureau of Land Management
Portland, Oregon

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Gentlemen:

Comments
of
Industrial Forestry Association
on the
Draft Timber Management Environmental Statement
Josephine Master Unit

The statement is certainly an all inclusive document covering most conceivable impacts of the Timber Management Plan on the environment. We commend the people involved for their efforts. The only drawback of such a large and involved statement is that it discourages public analysis and comment. Perhaps a summary covering the alternatives and their most direct impacts would be desirable for general distribution. This would help attain the objective of more public involvement in the planning process.

We agree with your proposed management for the high intensity forest management lands. You have recognized the intensive forest management practices now available and included them in the plan. We urge you to continue and strengthen your genetics program so that the gain in potential harvest from genetically superior planting stock can be recognized in the next planning period.

The trial harvest program slated for low intensity forest management lands is very conservative. These lands should be able to sustain a larger annual harvest than 12 MM. Reforestation should not depend on natural seeding. Seedlings should be planted under the remaining shelterwood trees after logging. Using past reforestation experience on this unit is not a valid basis of comparison. Reforestation was not a priority item in the past, natural reseeding was the method used with not enough volume removed from the stand to make natural reseeding possible. The two stage shelterwood system should at least be given a trial run on these lands.

An experimental program of harvest and reforestation should be instituted on limited management lands. It is our belief that a substantial part of these lands can be managed for limited timber production. This possibility needs further study.

General comments relating to specific pages of the statement follow:

Page 1-35. "The regeneration cut of a shelterwood harvest will remove up to 60%

Informed Forestry Action

of the original stand." We assume this refers to basal area, but it should be clarified. The Rogue River Forest is running into problems removing the shelter-wood trees after establishing seedlings under them without excessive damage to the new crop. Leaving too many shelterwood trees is part of the problem. We believe further study should be made in this area before settling on a firm 60% figure.

Page 1-39. Gross Yarding "The proposed minimum is eight inches in diameter and eight feet long." Gross yarding requirements should be reviewed with silvicultural, hazard reduction, utilization and air quality requirements in mind. Requiring the yarding of all logs meeting at least the scaling bureau definition of a utility log would probably remove enough material from each unit to satisfy silvicultural, hazard reduction and utilization requirements without creating too much of air quality problem when burned on the landing. Wood cutters will utilize some of this material but will not be able to take it all.

Page 1-74. "Limiting the size of units to 40 acres with irregular boundaries." Irregular boundaries may soften visual impacts but often present harvesting problems. Proper sale layout must be a major consideration along with visual impact in these areas. Consultation with the Forest Service might be helpful.

Page 1-78. "Seeding for Wildlife Forage." Using palatable species for seeding cut and fill slopes may defeat the purpose of the original seeding, erosion control. Wildlife and domestic animal grazing on such slopes can only increase erosion problems.

Page 2-249. "Mule Creek potential primative area." A portion of this area was included in the Wild Rogue Wilderness Area established by Congress. Since Congress has already made its decision, further study for wilderness should be unnecessary.

Page 3-9. "Burning would occur only between October and April." Further study should be made before putting such time restrictions on slash burning. If the BLM is going to accomplish the necessary slash disposal, there may be a need to expand the burning period on specific areas. Further consultation with the State and Forest Service is recommended.

Pages 3-31& 32. "80,400,000 cubic feet estimate of material to be stacked and piled on cutover lands over the ten years of the proposed action. Most of this material would be hauled away by firewood cutters." At a ratio of 85 cu. ft. solid wood content per cord, this equates to 94,588 cords of firewood per year available for home consumption from BLM lands alone. Material available from Forest Service, private lands and mills would boost this total. Using the population estimate of 66,000 people in Josephine County by 1990, and an average household of three people, BLM lands would supply every household in the county with 4.3 cords of wood. We doubt that they could handle it.

Page 3-50. The sediment yields allotted to road construction activities seem excessive. What is the source of these estimates?

Page 3-113. What changes will be necessary in the Timber Management Plan to follow the new guidelines regarding Spotted Owl habitat?

Page 3-120. "Tractor yarding is more injurious to aquatic habitat than cable yarding because it disturbs the surface more." This is too general a statement. Other factors such as slope and landing size would perhaps influence sediment yields more than yarding method.

Page 8-24. The old-growth would not be destroyed, it would be utilized and the stand converted to young growth.

Page 8-26. The old-growth habitat would be converted to young-growth habitat, destroyed conjures up a picture of total loss with no mitigating factors.

The following comments relate to herbicides and herbicide use:

Pages 1-4 and 1-5 reference to "minimum strength" may be misleading. Reference should be made to recommended strength to get the job done.

Page 1-5 a "prohibited list" is mentioned. We presume this is the one BLM has 2,4,5-T on. Of course there is no justification for such a list and especially for inclusion of 2,4,5-T and not 2,4,5-TP (Silvex). Having a "prohibited list" really is a duplication of two federal agencies (BLM and EPA).

Page 1-44. "Silvex is more damaging than T to conifers." You should add "when sprayed at the wrong time."

Pages 1-87 and 89. Tables 1-12 and 1-13 make reference to private spray acreages but apparently no private land managers were contacted according to the source information.

Page 3-18. Since you make note of TCDD you should include the worst case situation for TCDD in parenthesis under Silvex. With .1ppM TCDD total contamination would be .00003625 to .00010875 lbs. or .00064 to .0016 ounces. This total would never be accumulated in one place at one time.

Page 3-61. The first sentence of the first paragraph under heading "Water Bodies" says that degradation will occur faster in areas having repeated application. This either needs correction or substantiation.

Page 3-62. The degradation of TCDD in herbicide formulations can be more recently referenced by Crosby and Wong (1977) as follows:

> Crosby, D.G., and Anthony S. Wong 1977. Environmental Degradation of 2,3,7,8 - tetrachlorodibenzo-p-dioxin (TCDD). Science. Vol. 195 March.

Page 3-63. Second to last sentence. "Any chemical that would enter the stream would be likely to last longer due to the extreme low flow." No reference is made to degradation by ultra violet radiation (i.e., sunlight). You seem to be relying on dilution only rather than a combination of degradation and dilution.

Page 3-73. Reference to bio-accumulation of TCDD should note the extended discussion on p. 3-140. Also a better discussion of bio-accumulation occurs in USFS EIS.

Page 3-93. The discussion of impacts to non-target vegetation is negative. It could be made more positive by including mention that this impact is minimized by careful, timely application.

Page 3-94. A short introduction to the topic of "Mutations" is given. We should recommend BLM go to unpublished (but available) document by Frank Dost, 1977. "Toxicology of phenoxy herbicides and hazard assessment of their use in reforestation. Region 5. USFS. Available from Region 5 office, San Francisco or from Dr. F.Dost, Oregon State University, Corvallis, Oregon.

Page 3-129. First full paragraph states there is an insufficiency of knowledge on effects on wild animals of field use of TCDD contaminated herbicides. Actually, you should state that there has not been widespread, if any, evidence of harm to wild animals (whatever they are) in spray areas.

Page 3-135. The summary sentence seems unappropriately negative considering the discussion just prior to it. Also note page 3-140 discussion of animal exposure.

Page 3-140. Bottom of page and top of 3-141, ~~they~~ you should state the lbs. of TCDD assuming worst case of .1ppm.

Page 3-144. "It is impossible to speculate on the levels of TCDD..." If ~~they~~ you speculate on level of 2,4,5-TP the simple calculation can give a reading on level of TCDD assuring the worst case of .1ppm TCDD contamination of 2,4,5-TP. Note that this could not accummulate in one place at any one time.

Page 7-1. "An unknown decline in the water quality of some streams would occur due to contamination by sedimentation, debris slides, nutrient losses from soil on logged areas, and application of chemicals." A decline in water quality "may" occur but an equally valid statement would be it will not decline on most streams.

The following comments relate to economic considerations in the statement:

The BLM has gone to great lengths to analyze the economic base of the Josephine Unit Timber Shed and to evaluate the potential impacts of changes in timber management policy on this economic base. Although the BLM is to be commended for their superior effort in their economic sections, there are several suggestions we wish to make. First, there is so much economic data contained in this report, it is difficult to draw any conclusion ~~from~~ about what it all means. The sections contained in 2-191 through 2-215 are excellent but one could logically ask what does it all mean. We feel the EIS should summarize or state more clearly the importance of the forest industry and its relationship to the economically depressed Southwest Oregon economy. One very important comment in the EIS is that transfer payments now account for 25% of Josephine County's total income. That is amazing.

Secondly, we get the distinct impression that this EIS tends to minimize the importance of forest products industry because of the way percentages are developed and because of the way the forest industry is discussed. The forest industry is compared with the total economy in the Southwest Oregon area. This is misleading in the extent that the economic base is what really makes the local economy function and grow. We feel there should be a summary in this EIS which will analyze the importance of the forest industry to the "export base" (this is usually comprised of manufacturing, mining and farming). This is much more meaningful than saying that the forest industry accounts for about 16.4% (page 2-192) of all the employment in Josephine County. In actuality it looks like forest products industry comprises almost 75% of the export base which is so important to a thriving economy.

Section 3.3.5 (socio-economic conditions) is in need of some major organizational review. To begin, this section is improperly indexed. Secondly, the second paragraph on page 3-187 refers to a column labeled "Existing Timber Management - Recent Past 1973-1975." There is no such column in Table 3-19. The test also refers to first decade and long term views, but these are not illustrated in table 3-19.

We believe Table 3-19 tries to do too much and should be broken up into several tables. One table should examine the impacts of the proposed timber management plan on timber supply and direct and indirect employment and income. The second table might consider the impacts of the proposed management plan on "public finance" areas. The EIS should do a better job of explaining the concepts in the second and third paragraphs on page 3-187.

The second paragraph on page 3-193 is very confusing. A layman may have great difficulty in understanding "projections must be of a with and within nature."

It also seems that Section 3.3.5.2 should be summarized to concisely state the economic impact of the proposed action. The EIS contains so much information that it is difficult to determine what the impact is and even more difficult to determine if this is important. Much of this section tends to minimize the impact by illustrating it as a very small percentage of the total. Although this is true, the impact on the estimated 288 persons in our industry who will lose their jobs is not minimal. This is even more true when one considers the presently economically depressed condition of Southwest Oregon.

We take strong exception to the second paragraph on page 3-211 where it states that the even flow criterion implies that the welfare of future generations is considered equally important as that of current generations." Even flow does not necessarily imply that we are considering future generations on an equal footing. In fact, it could mean that we are short changing future generations perhaps more than we now realize. We believe that this statement should be removed from the EIS since it is not supportable.

We also disagree with the last paragraph on page 3-212 where you say that the long-term impacts on employment could be much greater if harvests were maintained at present levels on BLM land. Although this may be true, if just considering the BLM lands separately, the EIS should consider the possibility that harvests on other

ownerships will increase greatly in the future, thus, filling in any future decline in harvests that might occur on the Josephine Unit.

There are several comments that need to be made about the employment functions developed by Brian Wall of the PNW Experiment Station. The projections made in Wall's study are based on the data in Western Oregon. They are also based on past economic conditions and timber supply demand relationships. We believe that the projected increases in productivity in the logging, lumber and plywood sections are overstated. It is our belief that these employment functions will remain basically stable for the next 10 to 20 years. This comment is based on two basic assumptions.

First, the past increases in productivity were based on a relatively healthy forest industry that was not facing severe supply problems. It is our belief that the majority of forest industries will not be making substantial capital investments and increasing outputs during the next 10 to 20 years because of the great uncertainty of future timber supply. The supply crunch has also greatly strained the capital availability of many lumber and plywood manufacturers, thus reducing the possibility of immediate capital improvements.

Secondly, we believe that the increasing volume from small log material may in fact decrease the productivity of many logging operations as the per piece volume decreases and the number of pieces per logging show increases, it is doubtful that past improvements in logging productivity will continue.

It is our general belief that the employment relationships developed for the future are extremely optimistic and tend to understate the impact of reduced timber supplies on forest industry employment. It is our recommendation that the job relationships for 1980 and the 1990 periods closely approximate those existing today. As the timber supply situation begins to improve sometime after 2000 perhaps we will see greater improvements in the productivity of forest industry employees.

If you have any questions on our comments, please contact us.

Sincerely,

George E. Knowles

George E. Knowles
Director of Public Forestry

GEK:lf

UNITED STATES DEPARTMENT OF AGRICULTURE
FOREST SERVICE
Region 6
P.O. Box 3623, Portland, Oregon 97208

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April 24, 1978

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Mr. Murl Storms
State Director (911.1)
Bureau of Land Management
P.O. Box 2965
Portland, Oregon 97208

Dear Mr. Storms:

We have reviewed your Draft Environmental Statement for the Josephine Sustained Yield Unit 10-Year Timber Management Plan (INT-DES-78-4) and our comments are as follows:

1. The growth projection methods used are not readily apparent in this statement both for the existing timber stand and for the managed stands established after regeneration. We suggest you include a discussion on the project methods and illustrate with an example.

2. We suggest you consider computing a non-interchangeable cut from the low intensity lands and then program volume from these acres as research data or funding becomes available.

3. It would be helpful to subsequent reviewers and users of the Draft ES if the method of cut calculation was displayed and an example presented.

4. We recommend you consider the use of genetically superior stock and take credit for the allowable cut effect in the cut calculation even though on pages 1-23 it states " the use of genetically superior stock is not considered feasible since sufficient supplies will not be available within the 20-year planning horizon." We believe that, based on the present tree improvement program, improved seed could be available for nursery stock during this planning horizon. These supplies may not be sufficient to reforest the entire cutover area, but could be used on a substantial acreage. We anticipate significant increases in yield could be achieved through the use of genetically improved stock even during the next 20 years.

5. The plan takes credit for fertilization but does not take credit for genetically improved stock. It is our opinion that the genetically improved stock is an equally feasible alternative to the use of fertilizer to produce increased yields.

6. Page 1-50 of the Draft ES discusses the planting program. From the discussion it appears that about 6,000 acres will need to be planted within the sustained yield unit. Projected nursery shortages during the next decade may make these targets difficult to achieve. The BLM, which currently has limited nursery operations, has depended upon other sources for tree production. Because of the increased reforestation needs on all ownership it is unlikely that these alternative sources will continue to be available and we would expect this shortage to be a major obstacle in meeting the prompt reforestation goals and we suggest this subject be thoroughly explored in the Final ES.

7. The Draft ES on page 1-61 makes the statement that "the seed orchard block at Horning Seed Orchard is still 5-10 years from cone production." This orchard then should be producing quite a bit of improved seed one-quarter to one-half way into the 20-year planning horizon used and the fact that the orchard will be producing a considerable amount of seed within the 20 year planning horizon should be taken into account when computing allowable cut effect.

8. An additional item to be considered using allowable cut effect for genetics, is the cooperative Douglas-fir tree improvement program. This progressive type of program covers most of the JSYU and will become operational this year. Seed from the selected trees, in this program, could become available for reforestation use if it was harvested this year, thereby making it available for use in outplantings and calculation of the allowable cut effect.

9. It would seem that the Bureau could take credit for rust resistant sugar pine trees on the JSYU calculation. The Forest Service has provided the Bureau with a list of more than 100 tested sugar pine trees that will transmit useable levels of resistance to white pine blister rust to open pollinated progeny. The Bureau has harvested a significant amount, over 200 pounds, of seed from these trees and when this seed is combined with the yield from the cooperative program that the Forest Service has with the Bureau to develop white pine blister rust resistance in Western white pine and sugar pine, the seed needs of both agencies for these two species should be met by 1985. We feel that this is a viable enough program and that it should be considered in the calculation of the allowable cut.

10. The Draft ES on page 8-34 contains a statement that the community personal income would increase by 5.8 million dollars if herbicides were not used; this needs to be explained. It is apparently because of the increased amount of hand labor used in releasing the new stands. What needs to be covered is, what effect this intensive hand labor will have on management costs. We suggest the basis for this estimate be displayed in the ES.

11. There needs to be a display of how the reduced yield was derived from not using herbicides. An example might be obtaining full stocking on 85 percent of high intensity lands will not be possible without herbicides. Stocking levels will average only 150 trees per acres unless herbicides are used to carry out release. This needs to be covered in the ES.

12. The Draft ES attempts to make an environmental analysis on the use of herbicides. We do not believe the Timber Management Plan DES should be used to make the analysis on the use of herbicides. We suggest that it be handled in a separate environmental statement analyzing, in depth, the use of herbicides.

13. Table 8-4 on page 8-102 of the Draft ES refers to "Herbicides Entering Soil ECO System." We do not believe that the amounts of herbicides shown will reach the soils ECO system. We believe the herbicides will be intercepted by vegetation and destroyed by sun, weather and other elements. The elements in this table should be re-examined before issuance in the FES.

14. We could not find an overall economic evaluation of the combined effects of yield from the National Forest lands and the Josephine Planning Unit. This evaluation is needed in view of the reduction proposed by BLM in Josephine timber management.

We hope these comments will be of value in preparing your Final Environmental Statement. If you have any questions, please feel free to contact this office.

Sincerely,

for [signature]
R. E. WORTHINGTON
Regional Forester

from: Southern Oregon Citizens Against Toxic Sprays, et al
320 NW 6th St
Grants Pass OR 97526

RESPONSE TO THE DRAFT ENVIRONMENTAL
STATEMENT ON MANAGEMENT PLAN
FOR JOSEPHINE UNIT

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INTRODUCTION:

We, the undersigned, have collected our resources and thinking to respond to the Josephine Draft Timber Management Environmental Statement. The organizations represented here are comprised of a large number of Josephine, Douglas and Jackson County residents, who have much to gain or lose, depending on the decisions which will emerge from this ES. We are citizens whose health, employment and quality of life are directly affected by BLM's timber management of these lands. Many of us live on or own land directly adjacent to BLM land; all of us breath air, drink water, and eat food from this watershed. We have a commitment to improving the quality of our lives, and it is our hope that these comments will help the BLM to adopt safe and wise forest management.

This statement includes basic criticism of the proposed management plan, and comments on alternatives, wildlife, and watershed management. We wish to register our objection to the use of herbicides of questionabl toxicity and their adverse effects; we wish to question what we believe is an excessively high scheduled timber harvest, stemming from the following factors: inclusion of low-intensity lands in the first decade cut; low rotation figures; fertilization expectations; breakage expectations; and mathematical manipulation of wood meansuring. Finally, we take exception to the planned total removal of old growth, on both ecological and silvicultural bases.

In conclusion we would like to address the issue of a viable alternative: comments on the eight suggested alternatives, and the creation of criteria for conservative, efficient forestry with due regard to ecological pressures and full regard for the need for local employment.

Sincerely,

SOUTHERN OREGON CITIZENS
AGAINST TOXIC SPRAYS,
HEADWATERS ASSOCIATION, and
JOSEPHINE COUNTY FOOD CO OP

PART I: THREE DEFECTIVE ASPECTS OF THE MANAGEMENT PLAN

A: HERBICIDES: Both the amount and the quality of harvesting under the plan are contingent on a number of forestry practices which need further examination. The first is the massive use of aerial herbicide for vegetation release and site preparation. There is mention in the DES of a separate Western Oregon herbicide EIS in preparation, yet the current plan presupposes that no limitation on spraying will be forthcoming in that ES. A full 20% increase is accountable to herbicide site preparation and release (. 1-25). The government claims on p. 1-4 that "feasible alternatives to the use of herbicides will be investigated prior to a decision in favor of chemical treatment". This Allowable Harvest Plan and ES is a 10-year decision and a commitment to herbicides without serious discussion of alternatives.

There is currently an active and fruitful discussion occuring throughout the Northwest on the feasibility of manual alternatives for brush release. While the issues are only recently becoming clear, and the data on both sides incomplete, studies by GOATS (Appendix I) and HOEDADS (Appendix II) suggest that manual alternatives are more productive, selective, and cheaper than previously believed. There is accumulating evidence that herbicide programs are much more costly than BLM's analysis shows.

Since the government is responsible for having created unemployment in the softwood industry by allowing drastic overcutting, and is being forced to reduce the allowable cut to a legal level, it must do more than make feeble apologies or ignore the past; it must create employment in reforestation.

One possibility not addressed in the DES which deserves attention is the utilization of woods classified as "non-commercial"; SOCATS' inquiry into the salability and price of local oak suggest that the herbicide removal of this species is economically unsound. (Appendix III). Inquiry into hardwoods as commercial species should be addressed. Those not marketable can be chipped and used for fuel. In this time of "energy crisis" the continued waste of this resource is inexcusable. Studies of the implications of hardwood and waste removal on local unemployment should be included.

What is the cost benefit ratio for the herbicide program, and the cost benefit ratios for various manual release programs? Fred Miller's paper (Appendix IV) on Larry Brown's much-quoted study suggests hidden costs in the herbicide program. The DES is deficient in supplying any justification for chemical rather than manual management in these areas, and such justification should show cost-benefit ratios. The recent Forest Service Region 6 Herbicide ES indicates the cost-benefit ratio in the tanoak-chinquapin community and the tanoak-madrone community are perilously low, only 1.02 for the former. If indeed the use of possibly dangerous chemicals will provide us with only $1.02 for every $1.00 invested, even with the most optimistic calculations, this is a dubious endeavor.

If the creation of new brush fields can be limited or avoided with immediate replanting or other management techniques, we are then left with the 9000 acres of backlog brushfields — thus there are two separate issues. In site preparation, the policies of the Coos BLM ought to be described and evaluated as a possible alternative. Im planting immediately follows cutting, the new commercial saplings may be able to compete with brush. Statistics on the time between harvesting and replanting on backlog acreage should be included. Some foresters question the need for conifer release at all. If brush does present insurmountable problems for Douglas Fir, there are shade tolerant species to consider.

As for the accumulated backlog, these are the result of decades of mismanagement, and it is unrealistic to expect that extra time and money will not be necessary to redeem these lands. It is not fair to require a competitive cost-benefit projection for a manual alternative dealing with this problem on an immediate basis. A longer-term approach (more than 10 years) utilizing trials of alternatives is suggested, rather than locking the agency into a 10 year plan with massive use of herbicide.

Up to this point we have discussed the silvicultural alternatives; central to our objections, however, and to our interest in these laternatives is the continuing danger to people, animals, and the environment: water, soil, air, plants.

There is contradictory scientific evidence on nearly every aspect of the herbicide question. If the DES were to have even the pretense of objectivity, it would have presented this material rather than rely consistently on that part of the scientific community which supports (and is supported by) the herbicide industry. Noted medical researcher Dr. Granville Knight, M.D., testified under oath:

> "Many of these chemicals, including the herbicides 2,4-D, 2,4-DP, and 2,4,5-T have been used in increasing amounts since 1949 and are now distributed worldwide, reaching both the Arctic and the Antarctic. Wind currents carry these pesticides as a result of sprays and evaporation or residues picked up from

plants or the soil. We know that pesticides, when applied by air, are subject to widespread drift which may reach severl hundred miles in the case of extremely small particles. It has been estimated that no more than twenty percent reaches the targed".

-Par. 6, statement of 5/10/73 at Santa Monica, California

Studies at Florida State confirm these fears (see Appendix V). And in testimony in Civil Case 76-438, Ore. Dist., Dr. Boysie Day admitted he has seen harm caused to crops 15 miles away, and cases of negligent application has caused har ever farther away. (Tr 100).

As if theseexamples are not sobering enough, the following is an accoun t from an HEW report of what happened when an unusual weather condition superimposed itself (the possibility of unexpected storms, inversions, and other complicating conditions must be acknowledged in a prediction of herbicide impact):

"In 1965, the occurrence of a dust storm of unusual intensity allowed a study of the transport of pesticides over long distances and the subsequent precipitation to earth by rainfall. The dust storms were spawned on Jan. 25, in southern high plains of Texas. The dust-bearing air mass gradually moved eastward... by Jan. 26, (24 hours later) parts of the dust had reached Cincinnati, Ohio. Analyzed for content, the major pesticide components of the dust were DDT and chlordane with concentrations of 0.6 and 0.5 ppm DDE, ronnell, heptachlor epoxide, ——2,4,5-T and dieldrin."

-Report of the Secretary's Commission on Pesticides and their Relationship to Environmental Health, 1969, Dept. of HEW p.113.

The indirect loss of nitrogen from the soil by the removal of nitrogen producing species such as ceonothus and alder has been completely neglected. Effects on soil microorganisms and lichens and mosses should also be evaluated. Mycorrhizae are funcal organisms that live in association with conifers, attaching themselves to the conifer's root structure and thereby creating an extension of the tree's rooting zone (up to 100%); this greatly increases the water utilization capacity of the tree. The mycorrhizae are also capable of

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"chelating" mineral substances from the bedrock and produce antibodies which increase the trees' resistance to disease. There is evidence that this fragile association is disturbed by the application of herbicides. (Appendix VI).

The agency's own water quality recommendation is for a 200 foot buffer to protect water from herbicides both on Class I and II streams. Despite this recommendation, which surely was made in good faith, the DES has recommended only a 100-foot buffer on these streams and no buffer on smaller streams. On questions of economics and aesthetics, such horse-trading may be acceptable; but on issues of health, compromises are unacceptable. Any reference to studies of contamination of water resources is totally absent.

As for biologic impacts, the tables on pp. 3-74,5,&6 admit that the bioaccumulation in animals is unknown, the effect on animals of the herbicide carrier is unknown, the number of fish affected by toxic TCDD dosage is unknown, fish bioaccumulation of TCDD is unknown, the number of species and animals with herbicide-induced mutagenesis is unknown. It is just not acceptable to use anything on such as mass basis with these unknowns.

B. ALLOWABLE CUT.

Entirely separate from the issues of safety, and whether there are economically feasible alternatives, there is another question regarding herbicides which brings us to our second major doubt: is too much timber scheduled for harvest? Regarding herbicides, do they actually accomplish the alleged increase in growth capacity? Does stocking actually exist on these lands that have been sprayed and planted, or sprayed for release? While the BLM has not, apparently, done mass spraying hereabouts in the past, adjacent lands in local National Forests have been sprayed for up to 20 years, and this material is available and should be included. Forest management in southwesternr Oregon is a long history of reaping the benefits of centuries of natural growth, and repeated failure at replacing these 'renewable resources'.

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Moving on from the herbicide issue, we question the basis for the allowable annual timber harvest on other grounds as well. We believe harvesting the 12Mmbf on the low intensity management lands is totally unjustifiable. It seems a dubious practice to harvest at a rate which these lands will probably never regenrate, and deception to exempt it from the justification necessary for higher intensity lands. What evidence is available to support this rate of cutting? Apparently, the plan is to harvest approximately the same number of board feet per acre on low-intensity lands as are harvested from high-intensitv lands. We question the wisdom of this action and would like the government to justify and explain these plans. We also ask that the location of these acres be disclosed in the final EIS (the 5500 low intensity acres).

Massive fertilization, the other new device added to justify the 106MMbf cut is also unproven. The only institution doing fertilization research in SW Oregon is the University of Washington under Professor William Atkinson. To quote Prof. Atkinson: " After 8 years of plot layout and data analysis we have learned that research techniques developed for norther portions of the Douglas-fir region do not work well in southern Oregon". At this time the relationship between fertilizations and the incidence of disease is not well known; much additional experience and research will be necessary before adverse or beneficial effects of fertilization as it relates to disease control can be determined. (Hesterberg & Jurgensen, 1972, The Relation of Forest Fertilization to Disease Incidence, For. Chron., 48(2): 92-6.). Professor Atkinson provides guidelines for future studies in measuring fertilization response. The BLM in its usual fashion jumps at the chance to take more credit on its allowable cut— 7 million board feet more. Perhaps the government could consider doing the research before cutting the trees, and avoid a repetition of the genetic improvements fiasco.

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There is also reason to believe that fertilizer will rob moisture from seedlings. In Southern ORegon where moisture is the limiting factor of growth, it is imperitive that research precede fertilization. After going to the expense of removing the nitrogen-fixing species by use of petroleum-carried herbicides, and then purchasing limited resource artificial fertilizer is enough of an affront to economic planning - without adding the possibility that it may not be effective. If the agency has hard data to prove its proposals, it should be in the study.

Substantiation of the 80-year optimal rotation should be discussed, with alternatives, based on local yield tables. The rate of growth may indeed climax at 100 or 120 years.

Another place where the allowable cut figures seem inflated is in the stocking density on the high management lands. When the last allowable cut was calculated for all southwestern ORegon, Northwest Oregon yield tables were used. In these figures, breakage was discounted at 13%; in the new plan, only 2 % for breakage defect was computed. If the old figures were excessively high, solid evidence should be included in the ES to justify this departure. It seems likely, however, that this is mathematical manipulation to cover the fact that the actual growth capacity of BLM lands in the Josephine SYU is considerably less than suggested.

Another factor is the use of cubic feet rather than board feet. The ratio of wood in the two systems changes depending on how big trees are.

Cutting patterns here include excessive dependence on old growth for a number of decades, and then onto new growth later. A full discussion of the implications of this change in measurement should be included.

C. TOTAL REMOVAL OF OLD GROWTH

We also take exception to the total planned removal of old growth. On p. 5-7, under Adverse Impacts on Vegetation Which Cannot Be Avoided, the authors of the DES conclude "This (the total removal of all the old growth on high intensity lands) impact is highly significant". Indisputable justification for such action would seem to be necessary here, but are given nothing. We need to know more. Old growth is an invaluable source of time- and site-tested species for scientific research and for actual regenration of superior varieties. It is also of great importance in habitat and watershed protection and has inestimable recreation and aesthetic value.

While Wild Rivers and Wilderness areas, and even National Forests, are generally away from population centers, BLM land is intermingled with populated lands. Consideraton shoul be given to creation of more accessible recreation with watershed protection and wildlife refuge, particularly in areas where little old growth remains. Where, as in the Wolf Creek area, there hdas been local interest and research in developing such a system of trails and wildlife observation sites in cooperation with local landowners, some mention of these proposals should appear in the DES, both as resources and as part of the proposed management plan. This proposal includes the connection of existing resources (King Mt., Wolf Creek Inn, Wolf Creek Park, London Peak Trail, Golden Historic Site, and the Wild River trail system) with proposed wildlife, recreation, and watershed protection on BLM lands in that watershed, including the Robinson Gulch, Boardtree and Malone Peak tracts. BLM must be more sensitive to such local initiatives.

Even if the BLM cannot immediately justify such a recreation complex and dedicate such lands to it, a policy of total removal of old growth prohibits future generations from pursuing such ideas. We suggest that contested areas such as these be left in reserve rather than vindictively scheduled for cutting as soon as the ES is approved.

Such discussion regarding the Wolf Creek area should be expanded to the SYU as a whole. Given the history of mismanagement of the forest, it would seem unwise in the utmost to remove from future possibility any policies which place a higher value on old growth than present ones.

II. ALTERNATIVES

The Josephine DES offers eight alternatives to the proposed management plan. After commenting briefly on these, we would like to propose an alternative of our own, finding none of the others satisfactory.

Alternative #1 proposes putting the whole of the JSYU into wilderness. One cannot help but believe that this is a cynical offer on the part of the BLM, which historically has committed itself to overcutting, and whose priorities have consistently been to the needs of industy, to the detriment of the public, the workers in the industry, and the health of the forests. In an area committed so thoroughly to this industry, it would be an economic disaster to stop timber harvest altogether. But since the alternative is mentioned, it would be well for the BLM to investigate and report on the cost-benefit ratio for the enterprise as a whole in this area. It may be that unless we value (and price) our timber resource considerably higher, it would be economically sounder in the long run to stop cutting altogether.

Alternatives #2 and #3 seem rhetorical devices to support the chosen program: each of them omits one part of the management plan and shows that some people would be out of work because of it. While the practicalities of employing our population are important in any plan, the number of jobs is surely not the way to determine sound management. All of the old growth could be cut in 10 years, with a boom in employment, but surely such an alternative would be both illegal and unwise in terms of future economic and ecologic stability. Alternatives such as #2 (which show the effect of ignoring the brush release and site preparation, i.e. no spraying or manual removal) and #3 (no thinning, release, or fertilization) are irresponsible, not because they suggest a lower allowable cut, but because they violate the BLM's mandate: to sell timber at such a level which will not deplete the forest, while maintaining a sensible balance of harvesting with other forest needs -- recreation, endangered wildlife, other industries, research. The variables in formulating such a level of cutting are not the whims of adding or subtracting one management tool or another. The cut should be set at a level for which there are reliable, predictable, and safe management practices minus an amount specified for non-timber use.

On similar grounds, alternatives 4,5, and 8 are non-alternatives: the BLM is to be commended for acknowledging, after its recent inventory, that massive overcutting is being practiced in the JSYU. To propose a return to those practices (#3) is senseless. The State Forestry Plan (#5) similarly proposes that even-flow be suspended, and that a larger portion of the old growth be cut now with hopes that future management will increase yield later. Alternative #4 euphemizes this approach as "utilization of surplus inventory'; this violates the even-flow principle, which is Department of Interior policy.

Alternatives #6 and #7 are interesting attempts to look for ways to lessen theimpact on the economy of the proposed course of action: to hope that more timber will be forthcoming from other public or private land within the unit (not a reasonable hope, as stated) or that the economy as a whole can

shift toward wood substitutes. The role of the government in taking action toward changes in consumer patterns would seem most likely in two areas: 1) a more careful utilization of the natural products of our country's wealth — that is, selling lumber no cheaper than actual costs (many of which are hidden), and not wasting or destroying valuable but presently-considered 'non-commercial' products such as slash and hardwoods; 2) develop research and support for the diversification of local economies through other programs. The BLM and the Forest Service cannot pretend that decisions of supply and demand are outside their control; the federal government has vast power over both, and must use this power to the benefit of the people locally and nationally, and not has in the past to the benefit of the big corporations.

Historically the timber industry has — in China and the Balkans and in North Africa, as well as in New England, the Southeast, and the Great Lakes states forests — destroyed permanently or for a time the 'renewable' potential of the land to grow trees — in its desire for short run benefits. We must not and cannot follow this course.

Using the bases on which we have disagreed with the proposed management plan and the various offered alternatives, we suggest the following as the criteria for an alternative that is legal, careful of the impact on local employment, and thoughtful of the multiple uses and the future:

1. The decision to base sustained yield on only the high intensity lands is sound.
2. Only a fraction of the 12MMbf scheduled for cutting on low intensity land is justifiable — perhaps 10% this decade.
3. A predetermined acreage should be removed from the base where conflicting uses exist -- for example:
   a) 200 foot protective buffers along all streams and springs
   b) where watershed and recreation potential is promising
   c) some old growth, distributed throughout the region for observation and safeguard against massive impact of future silvicultural mistakes.
   d) where wildlife habitat can be preserved or enhanced.
4. Discount for breakage should be realistically set.
5. A sound rotation cycle should indicate a maximum rate for the old growth to be replaced - towards an even age distribution.
6. As noted in the DES, thinning productivity increases may be accounted for. This may, however, increase rotation age.

13/

7. Road construction should not proceed ahead of cutting needs. A 'no road' policy should be developed and used where other values are adversely compromised.
8. The government should determine the most wise and creative way to invest timber dollars in a reforestation program which not only reforests but creates employment for local residents. The private cooperative sector needs more responsibility in deciding what happens in our community. We have the intelligence, vision, and imagination to create programs. All you can think of is chemicals and poisons.

Some important reforestation programs that the private cooperative sector could implement are:

a) Containerized seedling nurseries in local drainages such as the Williams, Illinois, and north Josephine valleys. Containerized seedlings are the only economic way to replant because of superior survival rate. All of southwest Oregon must be replanted; not only the backlog on private and public lands, but also keeping current with ongoing cutting. If the BLm helped establish such a program now, by encouraging local small operators, they could produce seedlings for their own use and for marketing to other government and private agencies for their reforestation programs.

b) A number of hardwood mills and kilns could be located in the Medford District. There is enough oak, madrone and alder to support mills and to generate subsidiary activity such as furniture makers, wood crafts, etc. Hardwoods are going to be in great demand because of depletion of Eastern hardwood forests.

c) A whole complex of manual alternatives in site preparation and release, partially discussed in comments above. Also see testimony of Gerald Mackie (Appendix VII). Above and beyond the obvious benefit of spending BLM budget in these areas, there would be a multiplier effect on the economy. Money spent for chemicals and helicopter contractors does not accomplish this.

Members of Josephine County Food Coop, Headwaters Association and Southern Oregon Citizens Against Toxic Sprays offers its time and resources to assist the Medford and State office in preparing alternatives to the present plan.

COMMENTS ON BLM JOSEPHINE SUSTAINED YIELD UNIT TEN YEAR DRAFT TIMBER MANAGEMENT PROPOSAL

As a resident of Josephine County, I appreciate the opportunity to comment on the BLM's Timber Management Proposal. I attended the hearings in Grants Pass on 10 April and was impressed with the insightful testimony of many citizens, although from much of the media coverage, the unaware citizen would never know of their participation. Forest industry spokesmen got most or all of the coverage even though the majority of the statements opposed the management practices advocated by industry and government. Considering the vested interest of the industry and government and the quite different motivations of the citizens, and their lesser familiarity with the "process", one hopes that the number and quality of this citizen input will be seriously considered.

The industry spokesmen opposing the reduction in allowable cut said we "must have faith in the efficacy of intensive management." Where is the basis for such faith? We are seeing our forest resources squandered and our environment polluted with such intensive management practices. The preferred alternatives of the proposed plan only suggest more of the same. Should we really cut everything in sight now "even if it takes 10-15 years to reforest"? Cutting enthusiasts equate reduction in cut with loss of jobs. It seems to others that reforestation should have priority now, and that involves jobs. Government and industry admit that "mistakes have been made in the past" and that immediate reforestation of cut areas would have avoided the very problems (such as crop trees needing "release") which now require heroic efforts, yet it is expected we should go on and on compounding the problems. Any suggestion of the slackening of this destructive pace of cutting is met with paniced cries about "jobs". Why can't the BLM see that there are other things to do in the forest than cut down trees as fast as possible that will furnish people with employment and income and will maintain a better ecological balance and conservation of resources?

The complete waste of "unwanted species" still advocated is but one example. Consider the realities of our present situation. In this age of scarce and dwindling energy sources, how can we poison and burn as slash enough potential fuel to equal the amount of gasoline consumed in the U.S. annually? Although some foresters question the need for "release", if it is truly necessary, many of the hardwoods are marketable now that the Eastern supply is diminishing and the low-quality hardwoods and "slash" can be chipped to be used for fuel. Technology has been developed to accomplish this; Peter Koch has demonstrated how the South can quadruple woods-product output using such ideas.[1] Jim Weaver has introduced a bill in Congress that would establish a new timber sales set-aside program for small firms to utilize the thousands of board feet of timber which is now going to waste in the forests. Why should it take an act of Congress to accomplish this? Forest management should have initiated these ideas long ago, but still they are not even being considered! Citizen input has

[1] "Peter Koch: Wizard of Wood Use" in American Forests, February 1978, p. 29

made such suggestions for some time, only to have them ignored. Other possibilities that have been proposed are viniculture on steep slopes and Southern exposures where poor soil limits silvaculture, the gathering of native roots and herbs, commercial fishing, hardwood mills and kilns and furniture industry, greater use of recreation potential (these are all contingent on the cessation of herbicide use and allowing more diversity in tree and brush growth). Why can there not be at least token research into some of these ideas instead of the total committment to "spray and cut"?

One does not have to be a professional silvaculturalist to recognize some basics concerning monoculture. Farmers and gardeners can see that diversity in planting is a protection against disease and insects. Forest monoculture also limits and eliminates some species of wildlife, as does removal of old growth timber. Mature old-growth timber is the lowest fire hazard of all the cover types in western forests.[2] Dead trees are the required habitat for many birds which control insects harmful to forest trees.[3] "A forest which has been well managed for multiple use is fully stocked with trees of all sizes and ages and is generally composed of a variety of species. Trees will often occur in clumps of more than one age."[4] Another consideration which present management may not be taking in regard to high level forests is offered by R. M. Brett: "It has been shown that high altitude forests tend to have a higher water production rate than forests at a lower level. It is also true that these high, thin soils are more fragile than the more stable soils at the lower levels so man would be well served by offering even greater protection to high level forests so that these lands may continue to function efficiently as land protectors and water conservers."[5]

Douglas fir monoculture necessitates site preparation and "release", yet there are shade-tolerant species that would not require these techniques. Even if Douglas fir might be the most profitable species at present (and that is questionable), it would seem that the impacts of monoculture would prompt some research and trial of other species. Douglas fir monoculture is still experimental itself; why can't there be other "experiments"?

Overcutting, waste, ecological disruption are all undesirable, but governmental defense and justification for the use of herbicides ia absolutely incomprehensible. Four-fifths of the U.S. land surface is now covered with at least 151 million pounds of herbicide annually.[6] Federal, state, county, private industry, agriculture, and private home owners continue to pour it on in increasing amounts. This is an atrocity on the forests which extends to the ends of the earth. We hear government spokesmen making public statements claiming these chemicals are not poisons, that the EPA says they are safe and beneficial, and that there is no scientific evidence that they are harmful when applied according to EPA guidelines. Yet the very Environmental Impact Statements these men issue contain the refutations of these statements. The research indicting these chemicals is becoming mountainous. You will undoubtedly be besieged by it and the forthcoming EIS you issue will have to include it, so I will not cite any studies at present. Hazards are due to additive effects, accumulation,

2 "Excellent Forestry" by Gordon Robinson, from CONIFER, Winter 1969
3 Op. cit.
4 "Responsible Forestry" by Gordon Robinson from Sierra Club Bull, 12-71
5 "A Different View of the Forest" by R.M. Brett in American Forests 12-77
6 "Assessment of Ecological Effects of Extensive or Repeated Use of Herbicides" by William B. House et al., Advanced Research Projects Agency, DOD

carcinogenicity, teratogenicity, and mutagenicity. Claims that no ill effects have been suffered from spraying and of safety are empty considering that the health of the inhabitants of the sprayed areas has never been monitored by those doing the spraying. If such toxins are used, there should be routine and long-term monitoring of air and water, studies of soil productivity changes, of biologically-fixed nitrogen losses, increased susceptibility to insects and disease, and most important, of human and animal health. All these studies, plus other hidden costs of the herbicide program, such as transportation, storage, and disposal costs, the expense of keeping aircraft on standby, and government compensations to beekeepers and others adversely affected, would put the herbicide program out of any feasibility consideration on economics alone, but the real issue here is our right as human beings not to be guinea pigs in what amounts to a massive experiment.

Unless there are drastic changes in forest management in the next few years, not only will our public lands be hopelessly plundered, but the public health will be irrevocably damaged. Please discontinue the herbicide program and implement labor-intensive alternatives that will furnish employment in ecologically-sound techniques which make wise use of our resource instead of bring profit principally to one large industry. Many creative ideas were suggested at the hearings and you will undoubtedly receive many more in the comments. Please consider and act on them.

Yours truly,

Phyllis Cribby

Phyllis Cribby
1985 Hamilton Lane
Grants Pass, Oregon 97526

24 April 1978

April 24, 1978

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Mr. George Francis,
District Manager
Bureau of Land Management

Dear Mr Francis:

I would like to submit the following comments for your consideration regarding the Environmental Impact Statement (EIS) for the Josephine Master Unit timber sale plan that was recently published by you:

1. The statement does not address itself to the alternative conditions that would result from continuation of the catting practices which have been in effect in this district for the past decade or from the possible failure of the proprosed new inovations of such practices.

According to the Mail Tribune, you have been one of the originators of the proposed "Forestry Intensified Research" program for this area. I believe this type of research is long overdue; however, it also indicates that you are not sure of the results of the the many new programs proposed in your sale plan. It seems to me the impact of continuing the present program, particularly the three-stage cutting, until research is able to give you some positive answers to Southern Oregon forest management problems, might be much preferable to the conditions that could result from failure of some of proposed changes.

2. The EIS indicates that sales "can be laid out and harvested in Class II visual background without creating a visual intrusion". There is also an indication that partial cutting will be used to reduce or prevent visual impact. Since final harvest is proposed four or five years after the initial cutting, the background visual impact will be practically the same as a clearcut operation with a four or five year delay.

3. There seems to be a major conflict in the cutting area ~~or~~ acreage. The plan indicates a regeneration harvest of 36,000 acres in the 10 year period and 9,000 acres of final harvest. It also indicates final harvest will take place as soon as restocking is completed which is estimated to require four years. Even assuming that no final harvest will be undertaken on any stand previously partially cut, it seem like there will be 18,000 acres of regeneration cut at the end of the first five years and this whole 18,000 acres would be ready for final harvest in the last 5 years.

4. The E.I.S. estimates loss as a result of the proposed two-stage cutting at "one tree per acre per year." In another place windthrow loss is predicted to be one tree per three acres. Although these losses might result after a regeneration cut on an area that was previously cut using the three-stage cutting program, I am sure previous experience in this area would indicate a much greater loss than that on any area where 50% or more of the stand is removed from a virgin area. I would predict 100% loss on at least 50% of such stands within three years and 50% loss on the remaining areas.

Sincerly yours

John A. Carnegie

Mills
Riddle, Oregon

C. & D. Lumber Co.

Manufacturers of Old Growth Douglas Fir
Anti-Stain Treated • Smooth-End Trimmed
Kiln Dried Hem-Fir & Western Cedar
Post Office Box 27
Riddle, Oregon 97469

Telephone
Station to Station
503 874-2241
Person to Person
503 874-2281
WUX Riddle, Oregon

April 24, 1978

34

Mr. Murl Storms, State Director
Bureau of Land Management
P. O. Box 2965
Portland, OR 97208

RE: Draft Environmental Impact Statement for the Timber Management Plan
Josephine Master Unit.

Dear Murl:

The draft statement is a most impressive and overwhelming publication. It is obvious that a great deal of time and effort have gone into its preparation.

The plan proposes to reduce the annual allowable cut by 40 million board feet. This would be another devastating blow to the economy of Douglas and Josephine Counties which have already had the available timber supply seriously curtailed by wilderness areas, roadless areas, and wild and scenic river classifications. Every effort should be made to avoid or minimize this kind of a reduction.

To propose that more than one hundred thousand acres of land can not be reforested within a five year period and therefore be removed from managable land base is unacceptable. There are examples of similar lands that have been reforested within the prescribed time limits. There are also numerous examples of similar lands that have been reforested by natural means in slightly longer time intervals.

We suggest that you immediately start working on a research program and other alternatives to the management of these lands using the experience of other land owners and all available resources to solve rather than just avoid the problem.

Please keep these lands in the land management base until all other alternatives have been exhausted. Southern Oregon can't afford to have you give up.

Sincerely,
C & D LUMBER CO.

Everett P. Johnson
Managing Partner

EPJ/dn

JOSEPHINE COUNTY OREGON

(503) 476-8881

COURTHOUSE GRANTS PASS, OREGON 97526

Board of Commissioners
GEORGE A. CALVERT
BEN KILPATRICK
M. C. LOUGHRIDGE
Duane Schultz, Legal Counsel

April 24, 1978

35

Mr. Murl Storms
State Director
Bureau of Land Management
Oregon State Office
P.O. Box 2965
Portland, Oregon 97308

Dear Mr. Storms:

The Josephine County Board of Commissioners appreciates the opportunity to address our concerns relative to the Draft Environmental Statement of the Josephine Sustained Yield Unit. The Board of Commissioners has seen a real turn-around in the BLM, specifically in the area of cooperation and attitude since George Francis has been appointed Area Director. This attitude of cooperation has assisted our County Forestry Department, Road Department, and the public in general, in looking more favorably toward the Bureau of Land Management.

It is the Board's opinion that the forest management problems existing today on the Josephine Sustained Yield Unit are a reflection of past mismanagement. The 1971 Timber Management Plan as developed was never seriously implemented. For instance, the BLM in their '71 plan took credit for genetic tree improvement in all their reforestation efforts. Genetically improved trees are not now available and are not expected to be available within the next 20 years, according to the new plan. Clear-cut units were not adequately and properly restocked. As a result, well over 10,000 acres of productive commercial forestland are now non-stocked and inhabited by unwanted vegetation. The ill-fated three stage partial-cut system, as instituted by the BLM, resulted in partial cuts with decadent overstory and a system of regeneration that has not proven fruitful.

Unfortunately, the county has now been placed in the position, according to your newest plan, of paying for these errors in the form of a 40 million foot reduction in the Josephine County Sustained Yield Unit allowable cut. On the other had, new management with the Bureau of Land Management is attempting to aggressively pursue intensive forestry and BLM staff is developing a "can-do-it" attitude toward growing trees in southwest Oregon. The Bureau is

pushing for a research program to address specific reforestation problem areas, as well as research in other intensive management techniques.

It is evident that the Draft EIS is very complete specifically with respect to environmental concerns. The Board acknowledges the completeness of the document and the emphasis on economic and social impacts. The document, however, attempts to justify a 40 million foot allowable cut reduction with the philosophy that because the timber industry is cyclical, the proposed reduction will have low impact. We do not believe this philosophy is valid.

Timber supply in Josephine County is threatened not only by this plan but also by substantial reductions in timber base from wilderness legislation. Eleven million feet have been reduced from the Forest Service allowable cut due to the recent expansion of the Kalmiopsis Wilderness Area. RARE II is not yet settled, consequently the impacts may be far greater than 11 million feet. The question of herbicides has not yet been resolved. Heavy emphasis is placed on the use of herbicides in the BLM proposed intensive management program to assure composition control and regeneration success.

These uncertainties in the continuity of timber supply are of deep and grave concern to this Board. It is the Board's feeling that there is ample justification for leaving the allowable cut on the Josephine Sustained Yield Unit intact. We also feel that the BLM should look at timber supply in the context of the Forestry Program for Oregon.

With respect to land classification, the Board is in agreement with the philosophy of high intensity land management. We strongly feel, however, that another category should be developed between high and low intensity lands, that all lands currently in the low intensity category should fit into this new category, and that these commercial forestlands should be managed with a success oriented philiosophy and with all intensive management tools available.

There is example after example of lands located adjacent to our county forestlands that are in this low intensity or limited management category. Yet only a property line separates them from the county forests' successfuly regenerated, high yield lands. Our contention is that the low intensity lands, 55,675 acres, are in most cases manageable as shown by our adjacent county forestlands.

It is the Board's contention, especially in light of the O&C County Association review of the Josephine Sustained Yield Unit TPCC, that the 135,000 acres in these two classifications, if properly managed, could offset the reduction this plan calls for. It also appears that the growth predictions upon which the model forest is based are extremely conservative. In the computer model, each tree is essentially free to grow through its entire rotation,

using herbicide vegetative control, pre-commercial thinning, commercial thinning and fertilization regimes. How a tree will grow and respond under these optimum growth conditions only time will tell. However, over 8,000 acres of our county forestland have been pre-commercially thinned and preliminary growth response from this one activity is yielding results far beyond that anticipated in the BLM model. The predicted growth rates per the model are not much greater than those occurring naturally, without management intervention.

Due to the adverse impact of the 40 million foot reduction, Josephine County proposes that if a reduction is imminent, it be phased in equal increments over a 20-year period. This will allow time for research to determine and predict more accurately growth under managed conditions and more importantly, prevent the adverse effects of sudden timber supply shortage. This phase-in period of 20 years over a 400-year planning period, will not adversely affect long-range output. We feel that there is adequate justification, in light of our own experience on county forestland, to justify such a phase-in period.

The economic and social impacts to a small timber oriented community are great, as outlined in your Draft. O&C lands are in fact, held in trust by the Federal Government for the economic and social stability of the communities involved. We ask that the BLM not over react to past mismanagement but put its faith and trust in our current and future land management abilities for the sake of local communities so dependent on resources generated from BLM lands.

Sincerely,

BOARD OF COUNTY COMMISSIONERS

M. C. Loughridge

Forestry Department
OFFICE OF STATE FORESTER
2600 STATE STREET, SALEM, OREGON 97310 PHONE 378-2560

ROBERT W. STRAUB
GOVERNOR

May 8, 1978

37

Mr. Murl Storms, Director
Bureau of Land Management
PO Box 2965
Portland OR 97208

Dear Murl:

Enclosed please find a copy of our revised comments of your draft timber management environmental statement for the Josephine Sustained-Yield Unit. The comments sent you last week had been sent out prematurely and were incomplete.

A corrected copy has also been sent to Ron Smith of your Planning Team. Please excuse our errors.

Sincerely,

Ed Schroeder dc

J. E. Schroeder
State Forester

JES:zs

cc: State Clearinghouse (#7803 4 300)
Executive Staff
Tom Lane
Fred Robinson
Ray Miller
Robert Greaves
Ron Smith, BLM

Forestry Department
OFFICE OF STATE FORESTER
2600 STATE STREET, SALEM, OREGON 97310 PHONE 378-2560

ROBERT W. STRAUB
GOVERNOR

April 28, 1978

Mr. Murl Storms, Director
Bureau of Land Management
P. O. Box 2965
Portland, OR 97208

Dear Murl:

We appreciate the opportunity to review your draft timber management environmental statement for the Josephine Sustained-Yield Unit.

Our Forest Resource Study Team has reviewed the document and has come up with a few suggested points for clarification. We hope these comments will be useful to you in the development of your final plan.

Sincerely,

Ed Schroeder

J. E. Schroeder
State Forester

JES:zs

Enclosure

cc: Executive Staff
Tom Lane
Fred Robinson
Ray Miller
Robert Greaves
Board Members
Janet McLennan
Dick Worthington
State Clearinghouse (#7803 4 300)
A-95 Review Committee

Review of
DRAFT TIMBER MANAGEMENT ENVIRONMENTAL STATEMENT
JOSEPHINE SUSTAINED-YIELD UNIT

Summary

The draft Josephine Sustained-Yield Unit (SYU) Timber Management Environmental Impact Statement is a complete, professionally-prepared assessment and evaluation. The Oregon State Department of Forestry (OSDF) commends your planning staff for providing both a very readable plan and the rationale for proposed management decisions.

The OSDF preferred alternative does not support the proposed alternative as currently described in the JSYU. In particular, we are concerned with the rationale and advisability of the proposed change in land use designations (i.e., the reduction of over 111,000 acres from the commercial forest land base for reforestation reasons). Our specific concerns with this alternative and other general issues including planning interaction, rare and endangered species, and wilderness review procedures are discussed in the following text. Finally, the Board of Forestry and OSDF's proposed alternative, Forestry Program for Oregon (Alternative 5), has been improperly interpreted and/or presented. The OSDF recommends that the actual Forestry Program for Oregon figures and assumptions be included as an alternative; OSDF endorses this alternative, if revised. Details are provided in the following pages.

Planning Interaction

The Federal Land Policy and Management Act of 1976 requires the Bureau of Land Management (BLM) to develop land use plans consistent with state and local plans to the maximum extent accorded by federal law and policy (page 1-84). The draft plan states that this mandate "practically assures BLM consistency with state and local comprehensive plans." (page 1-85). The plan, however, does not discuss or evaluate this relationship, making it difficult to ascertain the degree of compliance with existing statwide land use planning goals and comprehensive plans.

- OSDF recommends that the relationship of JSYU land management alternatives to statewide goals and guidelines be discussed. An example from another environmental impact statement is attached as one effective method that the Department recommends.

Land Use Designation

The withdrawal of over 111,000 acres from commercial forest production represents a drastic change in management philosophy. The relative difficulty of reforesting lands in this portion of southern Oregon is generally accepted; the point of issue is how such lands should be managed. Most of the withdrawn land was placed in a deferred management category, somewhat misleadingly titled "low intensity management lands", with plans for a ten-year trial management program. The plan states, however, that

> "A two-stage shelterwood cutting system will be employed, and residual trees will provide shade and seed source to obtain natural reforestation following the regeneration cut . . . It is unlikely that any final harvest cut will occur

> on low intensity lands in the first decade since it is not expected that regeneration will occur within the proposal period." (emphasis added) (page 1-8)

This restricts the usefulness of such a trial program since the ultimate goal must be to evaluate the potential for reforestation after completing the harvest cycle. Your program appears to only test the capability of natural regeneration in the first stage of a two-stage shelterwood, as noted in the above passage. This apparently does not provide for testing artificial regeneration under a shelterwood, nor for survival of established reproduction after the final harvest cut. It seems likely that your trial program will not provide adequate information from which to make future land allocation and management decisions, despite a ten-year time frame and over 50,000 trial acres.

- OSDF recommends that the JSYU plan trial harvest program include some planned and implemented artificial reforestation and final harvest cuts.

A relatively imprecise inventory was used to allocate lands to the "low intensity management" class. As more refined information becomes available or viable management techniques are found, these lands should be immediately reclassified into more appropriate permanent land use designations. As currently written, the plan does not identify such a process.

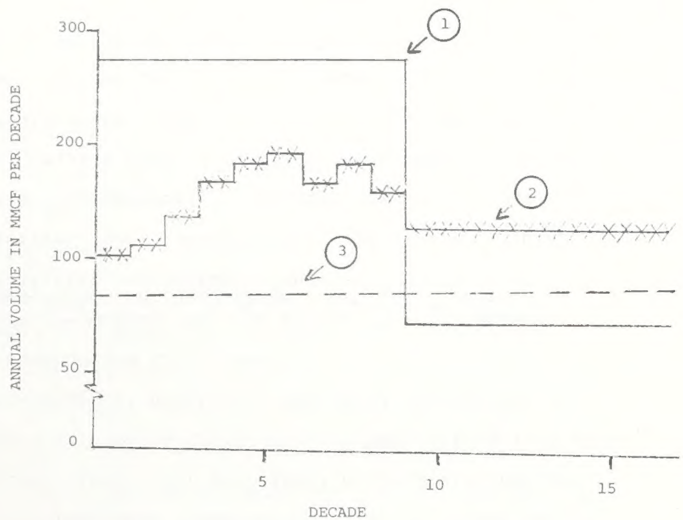
- OSDF recommends that "low intensity management lands" be retained in the commercial forest land base at least until a more precise inventory can be made. The criteria for withdrawal should be based on current state-of-the-art reforestation practices, not past failures based on poor management practices.

Alternatives

Alternative 5, Forestry Program for Oregon, is incorrectly presented in the draft plan. The Forestry Program alternative apparently has been revised by your planning staff, changing several key assumptions. It is not directly comparable to the proposed action, however, because of different assumptions regarding commercial production acreage, management intensities, average growth, and standing volume. The acreage base used in the Forestry Program more closely approximates the "No Action" alternative. A proportionate reduction based on acreage differences is not feasible without another computer run because of differences in yield assumptions between the two models.

A comparison of harvest levels between the Forestry Program alternative and the No Action and Proposed Action alternatives is appropriate and has been graphed below. The Forestry Program model is based on intensive management and does not reduce the acreage base to account for withdrawals of commercial forest land for anticipated regeneration failures; rather, it assumes that given current management practices and technology, most commercial forest land on the JSYU is reforestable following a suitable regeneration harvest. A copy of the Josephine Unit's disaggregated harvest contribution is attached. Comparison of acreage, inventory and allowable harvest for the Josephine between the Forestry Program and BLM are shown in this attachment.

Comparisons of Sustained Yield - Allowable Cut
By Decade



Key

—— No Action

XX Forestry Program for Oregon (actual)

--- Proposed Action

Comments

1. "No Action" alternative assumes that 116,000 acres, if harvested, could not be reforested. The Forestry Program for Oregon, based on a higher level of management intensity, assumes this acreage could be reforested using current state-of-the-art reforestation practices.

2. The Forestry Program for Oregon provides for an intermediate harvest level for the first nine decades, then the highest sustainable harvest level compared to the "No Action" and "Proposed Action" alternatives. The Forestry Program is based on higher management intensity, more rapid conversion of underproductive old-growth, and more commercial forest land in the production base than the "Proposed Action".

3. The "Proposed Action" withdraws over 111,000 acres from the sustained yield production base. This is the primary reason for the 33-percent reduction in annual allowable harvest. A significant portion of this withdrawn acreage can be managed on a sustained yield basis.

- OSDF requests that the Forestry Program for Oregon alternative be amended to reflect its actual assumptions, harvest levels and environmental, social and economic effects rather than those your planners incorrectly attributed to it. Our Department is willing to work with you to correct this error. We further request that the revised alternative be made available for public review and comment before a final alternative is chosen and implemented.

Several other alternatives do not appear to be realistic management options for the BLM, or consistent with inventory data. Specifically, alternative 1, No Management, would violate existing directives and authorities for timber management. Alternative 6, Substitute Sources, is unlikely given the inventory and management direction of other ownerships in the timbershed. Although other owners could compensate for some loss in BLM timber harvest, they could not completely offset the entire current BLM harvest levels, especially in light of increasing management restrictions, (e.g., withdrawals for endangered species on federal lands). Alternative 7, Substitute Materials, is unlikely because the current supply and demand situation for timber products has not abated and a viable range of sufficiently marketable alternatives has not been prepared.

- OSDF would prefer to have alternatives limited to those with current, practical processes. This would lessen the likelihood of misleading the public into considering nonworkable options.

Rare and Endangered Species

The draft plan appropriately recognizes that the BLM will take no action that jeopardizes rare and endangered species "where data are sufficient". Protection in the plan for spotted owls is inconsistent, however, with a recent administrative agreement between BLM and Oregon's Endangered Species Task Force. This conflict should be resolved. Because of the potentially large increase in set-aside acreage (3,330 acres under new commitment versus 440 acres under this plan) and additional acreage with management restrictions (9,900 acres under new commitment versus none in plan)[1/] you should attempt, as you state in the plan, "to achieve multiple-use compromises which will maximize overall public satisfaction." (page 1-64)

Land withdrawals or altered management practices for threatened or endangered plant species, in addition to those now in effect or pending for other animals, could have a large impact on the timber production base.

- OSDF recommends that these conflicts should be resolved through public input using social, economic, and environmental evaluations. Where possible, set-asides for these species should coincide with forest land that is not in the commercial production base or has already been withdrawn for other multiple-use constraints in order to minimize adverse economic impacts from reduced harvest levels.

[1/]Based on protection for 11 spotted owl pair.

Other Issues

Pages 1-23, 1-102 -- Although it may take four years to establish reforestation following a regeneration cut, it is not normally referred to as a "regeneration lag" in shelterwoods. Rather, it actually reduces the rotation length by shortening the time from final harvest to a mature stand by up to four years.

- OSDF recommends that you clarify this issue.

Pages 2-247 to 2-251 -- The wilderness review procedures in the plan specify that the O & C Act prevails over the Federal Land Policy and Management Act of 1976 regarding management of timber resources on O & C lands. The JSYU plan adds the criteria that the O & C lands must be "suitable for sustained-yield management as commercial timber lands." (emphasis added). The BLM's draft Wilderness Policy and Review Procedure (dated February 27, 1978), however, does not specify the sustained yield criteria. The JSYU plan seems inconsistent with the intent of the draft wilderness review plan. The JSYU plan includes unroaded O & C "low intensity management lands" for wilderness consideration. These areas were originally part of the commerical forest land base and might be added back to the commercial land base depending on results of the trial harvest program and/or this planning process.

- OSDF recommends that the JSYU plan regarding wilderness review be revised to be consistent with the intent of exempting all commercial forest lands in the O & C land base.

OREGON STATE DEPARTMENT OF FORESTRY

FOREST RESOURCE STUDIES TEAM

By: Robert D. Greaves Date: 4-27-78

Reviewed By: J. Michael Beyerle Date: 4-27-78

Reviewed By: Ray W. Miller Date: 4-27-78

MASON, BRUCE & GIRARD
CONSULTING FORESTERS
AMERICAN BANK BUILDING
PORTLAND, OREGON 97205

KARL D. HENZE
GILBERT M. BOWE
LUCIEN B. ALEXANDER
GWYNNE H. SHARRER
CARL A. NEWPORT
ROBERT J. KNEPPER
GLENN A. ZANE

TELEPHONE: 224-3445
AREA 503

September 22, 1977

Mr. William Holtsclaw
Oregon State Department
of Forestry
2600 State Street
Salem, Oregon 97310

Dear Bill:

This is our summary report on the results of work done under Supplement of 6/6/77 to our Professional Services Contract No. 2, dated April 22, 1977.

This work dealt with the contribution of the BLM Josephine Master Unit to the projected harvest levels for the Medford Timbershed. Specifically, you asked us to do the following four tasks:

1. Determine the disaggregated Josephine Master Unit contribution to the Medford Timbershed harvest output objectives.

2. Figure out the treatment opportunities at Management Intensity "B" level.

3. Display the Josephine Master Unit harvest output level under current policy.

4. Evaluate inventory changes in Josephine Master Unit since the OSU inventory was established.

1. Josephine Master Unit Contribution to Medford Timbershed Harvest Output Objectives.

The Josephine Master Unit contribution can be derived either by the area percentage that Josephine Master Unit is of the combined master units or by a productivity percentage, i.e., area weighted by site. The latter seems more realistic, particularly for the contribution, in the long run. In the following table, the breakdown of area by site is displayed for the total commercial forest land of the Jackson & Josephine Master Units and that portion of the Klamath Master Unit falling within the Medford Timbershed as defined in your Forestry Program for Oregon. This was the starting land base for Beuter's projections (before adjustment and updating).

TABLE 1

MASTER UNIT	MEDIUM SITE (Acres)	LOW SITE (Acres)	TOTAL AREA Acres	TOTAL AREA Percent	WEIGHTED BY SITE INDEX* Percent
Josephine	110,877.1	263,386.9	374,264.0	54.18%	53.50%
Jackson	93,556.5	192,231.9	285,788.4	41.37	41.58
Klamath	15,617.8	15,114.0	30,731.8	4.45	4.92
	220,051.4	470,732.8	690,784.2	100.00%	100.00%

*Midpoint of site index range was used. These weights were medium site of 143 and low site of 85.

If based on area only, Josephine should contribute 54.18 percent to the total harvest of these three combined master units. However, the productivity contribution, using area weighted by site index, indicates Josephine Master Unit should have a share of 53.5 percent of the total combined Josephine, Jackson and Klamath Master Units.

As you know, the Forestry Program harvest levels for BLM standard lands in the Medford Timbershed were calculated using land base and inventory combinations which consisted of only the portions of the master units falling within that timbershed. For BLM special land harvests for the Forestry Program, we used Beuter's output levels for special lands which were calculated for existing BLM administrative units then portioned to timbersheds on the basis of area.

The relationships of Forestry Program harvest levels for the Medford Timbershed are shown in the following table.

TABLE 2

MEDFORD TIMBERSHED FORESTRY PROGRAM
HARVEST LEVEL IN MM CUBIC FEET PER DECADE

DECADE	TOTAL ALL LANDS 1/	BLM MASTER UNITS STANDARD 1/	BLM MASTER UNITS SPECIAL	BLM MASTER UNITS TOTAL	JOSEPHINE MASTER UNIT 2/
1980	1,240	362	12	374	200
1990	1,190	370	12	382	204
2000	1,190	393	14	407	218
2010	1,220	421	14	435	233
2020	1,220	435	15	450	241
2030	1,220	440	16	456	244
2040	1,220	417	16	433	232
2050	1,220	434	17	451	241
2060	1,230	409	17	426	228
2070	1,230	380	18	398	213

1/ See Table 2.1, Page A-32, of Forestry Program for Oregon.

2/ Medford Timbershed BLM total times 53.5 percent.

The last column shows the contribution of the Josephine Master Unit to the total Medford Timbershed Forestry Program level.

2. The Treatment Opportunities

The following table shows the treatment opportunities for the next three decades in the Josephine Master Unit. They are in order to attain the OSDF programmed harvest level.

TABLE 3

TREATMENT AREA ON BLM LANDS OF MEDFORD TIMBERSHED
AND
THE SHARE ON JOSEPHINE MASTER UNIT

PERIOD	ITEM	BLM MU IN MEDFORD TM SPECIAL	BLM MU IN MEDFORD TM STANDARD 1/	BLM MU IN MEDFORD TM TOTAL	JOSEPHINE CONTRIBUTION (53.50%)
1975-85	FH	3,140	82,205	85,345	45,660
	CT		29,677	29,677	15,877
	PCT		7,957	7,957	4,257
	R. Reg.		10,804	10,804	5,780
	G. Reg.		586	586	314
	Conversion		11,155	11,155	5,968
	Fertilization		7,155	7,155	3,828
	M. Salvage		42,935	42,935	22,970
1986-95	FH	4,100	111,507	115,607	61,850
	CT		51,298	51,298	27,444
	PCT		3,153	3,153	1,633
	R. Reg.	3,014	76,168	79,182	42,362
	G. Reg.		4,136	4,136	2,213
	Conversion		11,155	11,155	5,968
	Fertilization		9,505	9,505	5,085
	M. Salvage		40,268	40,268	21,543
1996-05	FH	3,133	94,702	97,835	52,342
	CT		30,380	30,380	16,253
	PCT		31,721	31,721	16,971
	R. Reg.	947	38,096	39,043	20,888
	G. Reg.		2,068	2,068	1,106
	Conversion		11,155	11,155	5,968
	Fertilization		33,190	33,190	17,757
	M. Salvage		42,527	42,527	22,752

1/ From Table 2.5, Page A-42 of Forestry Program for Oregon

3. Josephine Master Unit Harvest Output Level Under Current Policy.

Dr. John Beuter defined Target A as "the basic estimate of management intensity in the future", (P. 9, "Timber For Oregon's Tomorrow"). It assumes that the future management intensity will tend to be a continuation of current policy and programs without making special effort for intensification such as Target B.

His Run A-1 represents the output level under current policy. Bear in mind, that he used existing administrative units as input for scheduling. The following table shows the projected harvest level of Josephine Master Unit under current policy based on its productivity share of 53.5 percent.

TABLE 4

BEUTER'S A-1 HARVEST LEVELS IN MM CUBIC FEET PER DECADE

DECADE	TOTAL FOR ALL LANDS IN THREE MASTER UNITS	ALLOCATED TO MEDFORD TIMBERSHED (88%)	JOSEPHINE MASTER UNIT CONTRIBUTION TO MEDFORD TIMBERSHED (53.5%)
1980	509.8	448.62	240
1990	509.8	448.62	240
2000	509.8	448.62	240
2010	501.3	441.14	236
2020	403.9	355.43	190
2030	401.1	352.97	189
2040	498.8	438.94	235
2050	489.0	430.32	230
2060	479.3	421.78	226
2070	472.6	415.89	223

4. Inventory Changes in Josephine Master Unit Since the OSU Inventory was Established.

Comparisons of inventory can be made for area and volume. These comparisons can be made between the two BLM SIMAC data bases, 1970 and 1976, as well as between Beuter's inventory data and BLM 1976 SIMAC inventory data.

a. Comparison between BLM 1970 and 1976 inventory data

Following is a comparison of the areas and volumes used in the two BLM plans.

TABLE 5

Items	1976	1970	Difference (1976-1970)
Total acres	222,896	334,738	- 111,842
Total volume (MCF)	929,811	1,908,631	- 978,820

The area of productive timberland was reduced by 111,842 acres from 334,738 acres in 1970 to 222,896 in 1976. The reduction is about one-third of the 1970 area base. The total volume inventory reduction was even greater than the area reduction from 1,908,631 MCF in 1970 to 929,811 MBF in 1976, or about 50% reduction. This means that the volume per acre was reduced from 5.70 MCF in 1970 to 4.17 MCF in 1976 or by about 27 percent.

b. Comparison of Beuter inventory with BLM 1976 inventory.

Based on the inventory data file used by Beuter, the initial inventory (adjusted and updated to 1980) for the combined Josephine, Jackson and Klamath Master Units was as follows:

TABLE 6

		INVENTORY IN M CUBIC FEET	
	TOTAL AREA	Total Item Volume	Converted to basis of 7"DBH to 5" top
Medium Site	201,630	1,118,384	1,065,128
Low Site	403,338	1,487,698	1,416,855
Hardwood	66,719	164,332	156,855
TOTAL	671,687	2,770,414	2,638,490

Using on the Josephine Master Unit productivity share of 53.5 percent the difference in inventory is as follows:

TABLE 7

	Estimated from Beuter Data, 1980	BLM as of 1976
Total Area, Acres	364,000 1/	222,896
Total Inventory, MCF	1,411,600 2/	929,811
Average Per Acre, MCF	3.9	4.2

1/ After adjusting and updating to 1980

2/ 2,638,490 x .535

Additional Comments:

You may have noted that the total areas in Tables 1 and 5 are 690,784.2 and 671,687 acres, respectively. The data in both Tables are for all the commercial forest land in the Jackson and Josephine Master Units plus the portion of the Klamath Master Unit which falls within the Medford Timbershed. Table 1 was taken from the original plot expansion data assembled for Beuter's study. Table 6 data is the same land base after adjustments and updating to the first projection decade. Dr. Beuter was not able to fully explain the causes for the changes without repeating considerable work originally done by others in his project. For our purposes, we think the comparison of the BLM plan data for 1976 is more comparable to Beuter's updated inventory rather than his original starting data base as shown in Table 1.

Beuter's study computed BLM harvests using the inventory shown in Table 6. Eighty eight percent of the resulting harvests were allocated to the Medford Timbershed on the basis that 88 percent of the total area was in that timbershed. In our projections for you, we applied the 88 percent to the updated inventory and then projected harvests.

In fact, the 30,731 acres of Klamath Master Unit was 100 percent in the Medford Timbershed and the exact portions of the Jackson and Josephine were unknown. However, we suspect it was less than 88 percent for the Josephine Master Unit. Therefore, the use of 53.5 percent contribution may slightly overstate its contribution.

The reduced area and volume as used recently by BLM in their proposed new Josephine Master Unit plan is the result of a new productive land classification. Our firm analyzed their new classifications in detail for the Association of O&C Counties. Our conclusion was that some of their eliminations from the productive land base were not justified. This report is available from Ray Doerner of Roseburg.

Enclosed is a copy of Page 46 from the BLM "Recommended Allowable Harvest Plan of July 1977 for the Josephine Sustained Yield Unit". This refers to the reasons for the reduction in allowable harvest from the current level of 146 million board feet to 93 million board feet. A principal reason was the .33 percent reduction in land base.

In this comparative analysis for you, we have discovered that the BLM existing volumes per acre and current annual growth estimates used in SIMAC were significantly reduced from those used in the 1970 SIMAC computations. For example, the average volume per acre was reduced from 5.70 MCF in 1970 to 4.17 MCF in 1976,or by about 27 percent. The average current annual growth was reduced from 15.6 cubic feet per acre per year in the 1970 plan to 6.7 cubic feet per acre per year in the 1976 plan, or a reduction of 57 percent.

Both of these changes had highly significant effects on the resulting new allowable harvest, yet, neither one was given as a reason for the allowable harvest reduction. These lower growth rates in existing stands have a particularly significant effect under calculations that are rigidly limited by non-declining flow. Lower estimated volume per acre available after the first decade (lower starting volumes plus lower growth rates) in the existing stands will limit the first decade harvest similar to the manner

in which low long run sustained yield under low intensity management affects first decade harvest with the well-know "allowable cut effect".

In Table 8 and Figure 1 attached, I have shown the relationship between the two BLM starting inventories and annual growth estimates for each existing age class. We bring this to your attention as part of the explanation for the significantly lower allowable harvest being proposed for the Josephine Master Unit. You may wish to discuss this with BLM and to conduct some analysis of your own to determine the relationship to your Forestry Program for Oregon.

May I suggest that you forward copies of this report to the BLM and to Dr. Beuter for their information?

Please let me know if this satisfies your request under the June 16, 77 Supplement to our contract.

Sincerely,

Carl A. Newport

CARL A. NEWPORT

CAN:cg

Attachments: 2

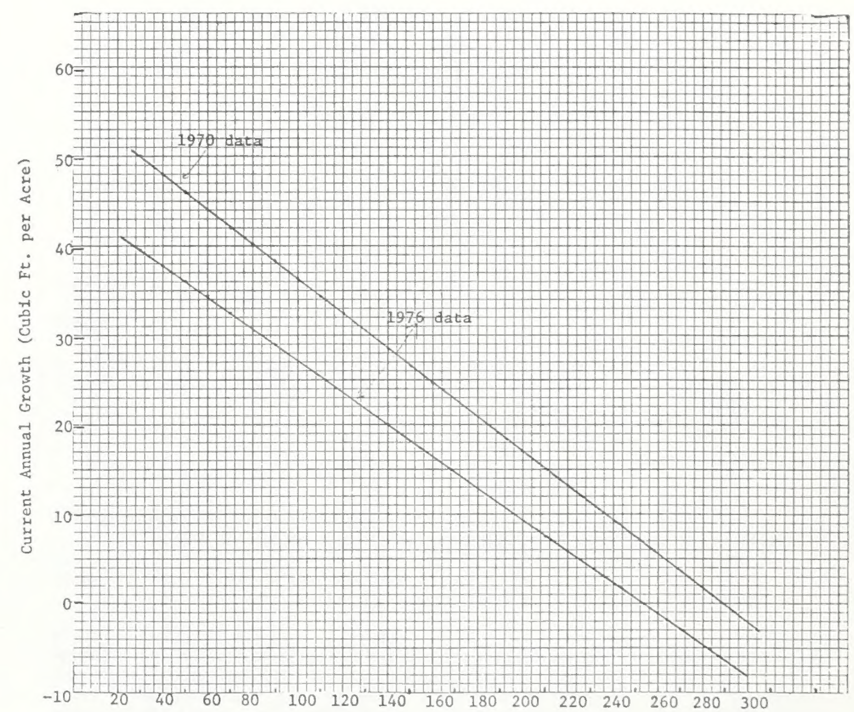
TABLE 8

Comparison of BLM Inventory and Growth Data Used in Josephine Master Unit Plans of 1970 and 1976 to Project First Decade Growth of Existing Stands.

	1970			1976		
AGE	ACRES	VOLUME PER ACRE (Cubic Ft.)	ANNUAL GROWTH PER ACRE (Cubic Ft.)	ACRES	VOLUME PER ACRE (Cubic Ft.)	ANNUAL GROWTH PER ACRE (Cubic Ft.)
Non-stocked	24,040			10,894		
1-5	9,192			1,729		
10	8,486			12,872		
20	6,356			4,330		
30	6,357	1,627	49.92	3,353	1,340	39.60
40	12,742	2,369	47.96	3,663	1,730	37.82
50	10,616	2,839	46.03	2,309	2,100	36.03
60	2,100	3,289	44.12	6,044	2,451	34.25
70	10,615	3,721	42.18	3,601	2,785	32.46
80	10,614	4,133	40.23	3,400	3,100	30.67
90	6,282	4,526	38.32	10,001	3,398	28.89
100	14,871	4,899	36.38	4,741	3,678	27.10
110	4,229	5,253	34.45	7,295	3,940	25.32
120	2,100	5,588	32.52	4,164	4,184	23.53
130	7,899	5,904	30.60	2,731	4,410	21.75
140	7,898	6,200	28.65	6,422	4,619	19.96
150	5,989	6,477	26.72	8,351	4,810	18.17
160	7,668	6,734	24.80	8,426	4,983	16.39
170	7,440	6,973	22.85	3,843	5,138	14.60
180	7,439	7,191	20.94	969	5,275	12.82
190	7,440	7,391	17.60	2,335	5,394	11.03
200	7,164	7,572	17.07	1,938	5,495	9.25
210	6,888	7,732	15.11	2,335	5,579	7.46
220	6,887	7,874	13.20	3,303	5,645	5.67
230	6,888	7,996	11.29	2,317	5,692	3.89
240	9,540	8,100	9.33	3,522	5,722	2.10
250	12,193	8,183	7.40	13,765	5,734	.32
260	12,192	8,248	5.47	14,257	5,729	- 1.47
270	12,193	8,293	3.56	8,924	5,705	- 3.25
280	9,057	8,319	1.62	969	5,664	- 5.04
290	5,924	8,325	- .33	321	5,604	- 6.83
300	65,439	8,312	- 2.25	47,929	5,527	- 8.61
310				2,317	5,432	-10.40
330				4,634	5,188	-13.97
350				4,892	4,873	-17.54
TOTAL OR AVERAGE	334,738	5,696	15.58	222,896	4,172	6.66

BLM JOSEPHINE M. U.

Comparison of Current Annual Growth per Acre for existing stands as used in 1970 and 1976 plans



Executive Department

INTERGOVERNMENTAL RELATIONS DIVISION

ROOM 306, STATE LIBRARY BLDG., SALEM, OREGON 97310

ROBERT W. STRAUB, GOVERNOR

April 28, 1978

38

State Director
Bureau of Land Management
P.O. Box 2965
Portland, OR. 97208

Dear Sir:

RE: Josephine Planning Unit
PNRS 7803 4 300

Thank you for submitting your draft Environmental Impact Statement for State of Oregon review and comment.

Your draft was referred to the appropriate state agencies. The Department of Land Conservation & Development, State Historical Preservation Office, Highway, Energy and Geology offered the enclosed comments which should be addressed in preparation of your final Environmental Impact Statement.

We will expect to receive copies of the final statements as required by Council of Environmental Quality Guidelines.

Sincerely,

Martin W. Loring, Manager
Grants Coordination &
Management Section

MWL:wb

Attachments

AN EQUAL OPPORTUNITY EMPLOYER

OREGON PROJECT NOTIFICATION AND REVIEW SYSTEM

STATE CLEARINGHOUSE

DEPARTMENT OF LAND CONSERVATION AND DEVELOPMENT

Intergovernmental Relations Division
240 Cottage Street S.E., Salem, Oregon 97310
Ph: 378-3732

MAR 13 1978

PNRS STATE REVIEW SALEM

Project #: ______ Return Date: APR 21 1978

ENVIRONMENTAL IMPACT REVIEW PROCEDURES

1. A response is required to all notices requesting environmental review.
2. OMB A-95 (Revised) provides for a 30-day extension of time, if necessary. If you cannot respond by the above return date, please call the State Clearinghouse to arrange for an extension.

ENVIRONMENTAL IMPACT REVIEW
DRAFT STATEMENT

( ) This project does not have significant environmental impact.

( ) The environmental impact is adequately described.

(X) We suggest that the following points be considered in the preparation of a Final Environmental Impact Statement regarding this project.

( ) No comment.

REMARKS

Agency ______ By ______

7803 4 300

I. <u>Area Has a Plan and Approved Compliance Schedule</u>

This project and its related land use implications must be coordinated and consistent with the County of **Josephine** comprehensive plan and efforts to update the plan (i.e. the **county's** compliance schedule and work program for reaching compliance with the statewide land use goals). Consideration of the relationship between the statewide land use goals

#4 Forest Lands and the project should receive special attention. In addition, the applicant should make every effort to insure that the project makes use of recognized citizen and agency involvement programs established by the local jurisdiction in accordance with the statewide land use goals.

March 16, 1978

ph

OREGON PROJECT NOTIFICATION AND REVIEW SYSTEM

STATE CLEARINGHOUSE

Intergovernmental Relations Division
240 Cottage Street S.E., Salem, Oregon 97310
Ph: 378-3732

RECEIVED
MAR 13 1978
STATE PARKS
BRANCH

PNRS STATE REVIEW

Project #: ____________ Return Date: ____________

ENVIRONMENTAL IMPACT REVIEW PROCEDURES

1. A response is required to all notices requesting environmental review.
2. OMB A-95 (Revised) provides for a 30-day extension of time, if necessary. If you cannot respond by the above return date, please call the State Clearinghouse to arrange for an extension.

ENVIRONMENTAL IMPACT REVIEW
DRAFT STATEMENT

( ) This project does not have significant environmental impact.

(X) The environmental impact is adequately described.

( ) We suggest that the following points be considered in the preparation of a Final Environmental Impact Statement regarding this project.

( ) No comment.

REMARKS

CHAPTER 3.3.2., PARAGRAPH 1 ON PAGE 166 IF FOLLOWED, SHOULD ASSURE COMPLIANCE WITH APPLICABLE FEDERAL LAWS AND REGULATIONS ON CULTURAL RESOURCES IN THIS JOSEPHINE DRAFT TIMBER MANAGEMENT ENVIRONMENTAL STATEMENT.

Agency: HISTORIC PRESERVATION OFFICE
STATE PARKS & RECREATION BRANCH
525 TRADE STREET SE
SALEM, OREGON 97310

By: David G. Talbot

OREGON PROJECT NOTIFICATION AND REVIEW SYSTEM

STATE CLEARINGHOUSE

Intergovernmental Relations Division
240 Cottage Street S.E., Salem, Oregon 97310
Ph: 378-3732

PNRS STATE REVIEW

Project #: 7803 4 300   Return Date: APR 21 1978

ENVIRONMENTAL IMPACT REVIEW PROCEDURES

1. A response is required to all notices requesting environmental review.
2. OMB A-95 (Revised) provides for a 30-day extension of time, if necessary. If you cannot respond by the above return date, please call the State Clearinghouse to arrange for an extension.

ENVIRONMENTAL IMPACT REVIEW
DRAFT STATEMENT

( ) This project does not have significant environmental impact.

( ) The environmental impact is adequately described.

(X) We suggest that the following points be considered in the preparation of a Final Environmental Impact Statement regarding this project.

( ) No comment.

REMARKS

We have reviewed your EIS and have the following general concern:

We would urge the coordination of visual management plans or permits of entry-as appropriate, and if needed-along the following highway corridors in Josephine County:

Pacific Highway	I-5
Redwood Highway	US 199
Jacksonville Highway	ORE 238
Rogue River Highway	ORE 99

For coordination, please contact:

A. Shirley, Jr. Region Engineer
Region 3 Office
1523 SE Cobb Street
Roseburg, OR 97470

Agency Highway   By Gary A. Potter

OREGON PROJECT NOTIFICATION AND REVIEW SYSTEM

STATE CLEARINGHOUSE

APR 21 1978

Intergovernmental Relations Division
240 Cottage Street S.E., Salem, Oregon 97310
Ph: 378-3732

RECEIVED
APR 21 1978
DEPT. OF ENERGY

PNRS STATE REVIEW

Project #: ______   Return Date: May 1

ENVIRONMENTAL IMPACT REVIEW PROCEDURES

1. A response is required to all notices requesting environmental review.
2. OMB A-95 (Revised) provides for a 30-day extension of time, if necessary. If you cannot respond by the above return date, please call the State Clearinghouse to arrange for an extension.

ENVIRONMENTAL IMPACT REVIEW
DRAFT STATEMENT

( ) This project does not have significant environmental impact.

( ) The environmental impact is adequately described.

(X) We suggest that the following points be considered in the preparation of a Final Environmental Impact Statement regarding this project.

( ) No comment.

REMARKS

No time for adequate review - see attached.

Agency ______   By Bill Mackie

29-2

Department of Energy

ROBERT W. STRAUB
GOVERNOR

LABOR & INDUSTRIES BUILDING, ROOM 111, SALEM, OREGON 97310 PHONE 378-8327

April 26, 1978

Comments on 7803-4-300

1. No time for adequate comment - received April 26.

2. No consideration has been given alternatives to herbicide use.

3. EIS is inadequate in its researching of long term effects of herbicide use.

4. Silvex is a long term toxic herbicide and its residual and cumulative effects in humans has been documented.

5. Round-up, Krenite, Dalapon - We were unable to obtain chemical compositions for these products, and therefore are unable to make an educated judgment on their use.

6. Inadequate evaluation of impact on recreation, esthetics, minerals, wildlife, water quality, livestock forage and other resource values of the forest.

7. Energy efficiency of alternatives to fertilizer and herbicide are not explored or evaluated.

BM:sa

OREGON PROJECT NOTIFICATION AND REVIEW SYSTEM

STATE CLEARINGHOUSE

Intergovernmental Relations Division
240 Cottage Street S.E., Salem, Oregon 97310
Ph: 378-3732

RECEIVED-PTLD
APR 21 1978
DEPT OF GEOLOGY

PNRS STATE REVIEW

Project #: 7803 4-300 Return Date: April 27, 1978

ENVIRONMENTAL IMPACT REVIEW PROCEDURES

1. A response is required to all notices requesting environmental review.
2. OMB A-95 (Revised) provides for a 30-day extension of time, if necessary. If you cannot respond by the above return date, please call the State Clearinghouse to arrange for an extension.

ENVIRONMENTAL IMPACT REVIEW
DRAFT STATEMENT

( ) This project does not have significant environmental impact.

( ) The environmental impact is adequately described.

(X) We suggest that the following points be considered in the preparation of a Final Environmental Impact Statement regarding this project.

( ) No comment.

April 24, 1978

REMARKS

Inspection of the available bibliographic entries and the mining text suggest that the literature was not thoroughly researched with respect to mineral potential and the influence it may have on future operations. For example, Bulletins 14 and 88 of this Department are not cited.

Additionally, the management of the Josephine unit should be developed with due consideration of future mineral potential as well as historic records of mining activity. It is apparent that future mining activity is not governed by past activity in much the same manner that future logging activities are not necessarily governed by past logging activities.

Thank you for the opportunity to make these general comments. We appreciate being placed on the mailing list.

Sincerely,

JDB

John D. Beaulieu
Deputy State Geologist

JDB/syl

Agency Geology By John D. Beaulieu

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Division of Ecological Services
Portland Field Office
727 N.E. 24th Avenue
Portland, Oregon 97232

Reference: ES

May 2, 1978

MEMORANDUM

To : State Director, Bureau of Land Management, Portland, Oregon

From : Field Supervisor, Fish and Wildlife Service, Portland, Oregon

Subject: Review of Draft Environmental Statement for Josephine Sustained Yield Unit Ten-Year Timber Management Plan (INT-78/4)

We have reviewed the subject draft as requested. We apologize for the delay in response but we did not receive the draft until after the comment due date.

General Comments

The statement is well prepared and comprehensive in its analysis of the proposed timber harvest impacts. However, there are some aspects of the program which we believe need further definition. The following comments are intended to clarify specific fish and wildlife resource concerns.

Specific Comments

Table I-9, Page 1-67. It is unclear, in light of the 200-foot buffer strip recommendation provided by fisheries, recreation, wildlife, and watershed concerns, why a 100-foot buffer strip width is proposed for Class I streams. The 200-foot width would provide needed protection for water quality, riparian vegetation, and wildlife. We also question why Class I and II streams are included in the discussion of "effects" (Section 1a) when the 200 foot buffer strip width applied to Class I streams only. In other words, it is misleading to compare job and income losses for recommendations concerning Class I and Class II streams with losses associated with Class I streams alone. Figures should be provided comparing the losses associated with both 200 foot and 100 foot buffers on Class I streams only.

Table I-10, Page 1-71. The rationale for choosing 1,590 acres for roadless area study over the originally suggested 3,590 acres is based on the fact that the latter acreage contains some roads and cutovers. However, it is our understanding that even roaded areas can be considered for such study if the roads are of a historical nature, i.e. not maintained and/or used. Also, since a temporary allocation of the 3,590 acres will not affect timber harvest or local economics and will significantly increase the acreage of protected wildlife habitat (at least temporarily), we recommend retention of the originally allocated acreage.

Page 1-75. It would seem that timber harvest operations are of a more frequent and continuous audibility than the jet aircraft referred to in the table.

Table 2-16, Page 2-76. The bald eagle is now officially listed as threatened in Oregon under the Endangered Species Act of 1973. We recommend, in light of this classification, that habitat protection (as designed for the northern spotted owl) also be considered for the bald eagle.

Reconstruction and Maintenance, Page 3-31, par. 1. This paragraph analyzes the estimated erosion expected to occur during reconstruction and maintenance of logging roads. Unmaintained roads often attract off-road vehicle use which can also contribute to erosion and water quality degradation. Such activities can also lead to harrassment of wildlife, particularly deer populations. To help prevent these problems, a program to revegetate unused or unmaintained access roads should be adopted as part of the timber management program.

Page 3-101, par. 2. This statement implies that only those species presently listed as threatened or endangered by the Service will be considered for protection. Unfortunately, many of the plants classified as rare, threatened, or endangered by the Oregon Rare and Endangered Plant Species Task Force will not be officially classified as such by the Service in time to save them from destruction. We recommend that those plants proposed for listing be given consideration in each individual EAR prepared prior to specific logging activity.

Page 3-112, Par. 2. This paragraph states that impacts to bald eagles are not expected to be great provided specific trees which are currently in use by eagles are not removed. What efforts will be made to insure protection of this habitat?

We appreciate the opportunity to review and provide comments on the draft statement and hope that they will be of use to you in preparation of the final statement.

Edwin F. Roby
for John W. Kincheloe

F. DONALD LAWS
CHM
EDDIE ARNOLD
V CHM
JOE SANDERS
SEC

RICHARD T. HOWSLEY
EXEC. DIRECTOR

33 NORTH CENTRAL
SUITE 211
MEDFORD
OREGON
97501

779-7555

MEMBERS
ASHLAND
BUTTE FALLS
CAVE JUNCTION
CENTRAL POINT
EAGLE POINT
GOLD HILL
GRANTS PASS
JACKSON COUNTY
JACKSONVILLE
MEDFORD
PHOENIX
SHADY COVE
TALENT

SPECIAL DISTRICTS
BEAR CREEK VALLEY
SANITARY AUTHORITY
CITY & RURAL FIRE
DISTRICTS
IRRIGATION DISTRICTS
SOIL & WATER CONSERVATION
DISTRICTS
WATER DISTRICTS
SCHOOL DISTRICT 549C
ROGUE VALLEY TRANSPORTATION
DISTRICT

ROGUE VALLEY COUNCIL OF GOVERNMENTS

April 27, 1978

40

State Director
Bureau of Land Management
P.O. Box 2965
Portland, Oregon 97208

Dear Director:

RE: A-95 Review Comments -- DEPARTMENT OF INTERIOR
Project: TIMBER MANAGEMENT PLAN FOR JOSEPHINE SUSTAINED YIELD UNIT
State ID#: 7803-4-300

The Rogue Valley Council of Governments Board of Directors voted to accept the attached comments and directed that they be forwarded to the applicant, grantor agency, and the State A-95 Clearinghouse.

In addition, as required in OMB A-95, comments from other local agencies are included, if applicable.

Thank you for complying with the regional A-95 requirements.

Sincerely,

Richard T. Howsley

Richard T. Howsley
Executive Director

RTH/sp

Enclosures

cc: Michael Burton, Assistant Administrator
State A-95 Clearinghouse

2

Rogue Valley Council of Governments

A-95 Review

RVCOG NO. 7803-04

APPLICANT: DEPARTMENT OF INTERIOR Bureau of Land Management P.O. Box 2965 Portland, Oregon 97208	GRANTOR AGENCY: Department of Interior
TITLE: TIMBER MANAGEMENT PLAN FOR JOSEPHINE SUSTAINED YIELD UNIT	REQUEST: Request for comments LOCATION: Jackson and Josephine Counties

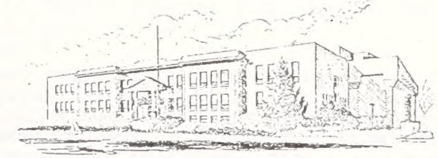
SUMMARY: The ten year plan proposes an annual allowable harvest of 106 million board feet from the 425,720 acres administered by BLM in the Josephine Sustained Yield Unit, compared to the allowable cut of 146 million that has been in effect since 1971. Treatments implicit to the proposal include road construction, harvest employing predominantly shelterwood systems with some clearcutting, slash disposal, site preparations precommercial thinning, fertilization, and commercial thinning.

CONTACT PERSON: State Director BLM	STATE ID NO. 7803-4-300
DATE RECEIVED: March 10, 1978	ESTIMATED APPLICATION FILING DATE:

AGENCIES TO COMMENT	COMMENTS
Jackson County Board of Commissioners	Recommend approval.
Josephine Co. Board of Commissioners	In favor of proposed project and do not feel it is in conflict with any existing or proposed plans.
City of Grants Pass	
City of Cave Junction	

RECOMMENDED COUNCIL ACTIONS: No comment.

JOSEPHINE COUNTY OREGON



Board of Commissioners
GEORGE A. CALVERT
BEN KILPATRICK
M. C. LOUGHRIDGE
Duane Schultz, Legal Counsel

(503) 476-8881 COURTHOUSE GRANTS PASS, OREGON 97526

April 4, 1978

APPLICANT: DEPARTMENT OF INTERIOR
PROJECT: TIMBER MANAGEMENT PLAN FOR JOSEPHINE SUSTAINED YIELD UNIT

Mr. Richard T. Howsley, Executive Director
Rogue Valley Council of Governments
33 North Central, Suite 211
Medford, Oregon 97501

Dear Mr. Howsley:

RE: Request for A-95 Review Comments.

This letter is being written in regard to the requests for comments on the above entitled matters (see copies attached).

Please be advised that Josephine County is in favor of the proposed projects and certainly does not feel that they are in conflict with any existing or proposed plans.

If there is anything further you need from us regarding our favorable reaction to the proposed projects, please let us know.

Sincerely,

BOARD OF COUNTY COMMISSIONERS

M. C. Loughridge

M. C. Loughridge, Commissioner

NES:nms

Enclosures

RECEIVED APR 6

Department of Energy
Region X
1992 Federal Building
915 Second Avenue
Seattle, Washington 98174
206-442-7260

April 27, 1978

43

George Francis
District Manager
Medford District Office
Bureau of Land Management
310 West 6th Street
Medford, Oregon 97501

Dear Mr. Francis:

The Department of Energy (DOE) appreciates the opportunity to comment on the Draft Environmental Impact Statement (EIS) for the Ten Year Timber Management Plan for the Josephine Sustained-Yield Unit of the Medford District of the Bureau of Land Management (INT DES 78-4).

Two of the purposes that Congress declared, when it established the Department of Energy by enacting the DOE Organization Act (42 USC 7101), were:

° To achieve, through the Department, effective management of energy functions of the Federal Government, including consultation with the heads of other Federal departments and agencies in order to encourage them to establish and observe policies consistent with a coordinated energy policy, and <u>to promote maximum possible energy conservation measures in connection with the activities within their respective jurisdictions</u> (42 USC 7112(2)); and,

° To place major emphasis on the development and commercial use of solar, geothermal, recycling and other technologies <u>utilizing renewable energy resources</u> (42 USC 7112(6)). (emphasis added)

This Regional Office is utilizing the EIS comment process as one way to assist in achieving the purposes declared by Congress.

EIS's are a most appropriate means to evaluate and present the energy consumptive characteristics consequent to proposed Federal agency actions, alternatives to proposed actions, and proposed mitigative measures. EIS's are also appropriately employed to develop and present energy conservation measures and renewable-resource energy measures which would not only reduce the energy consumed consequent to Federal agency actions but also reduce the nation's dependence on nonrenewable energy resources.

The Council on Environmental Quality <u>Guidelines for the Preparation of Environmental Impact Statements</u> urge that EIS's consider alternatives that will significantly conserve energy, and include energy use and energy conservation among the areas of environmental impact which should be considered in EIS's (just as air quality, water quality, noise, etc., must be considered).

This Office therefore reviewed the referenced Draft EIS to determine not only the specific impact of the alternatives on energy consumption, but also: (1) the adequacy of EIS's broad consideration of energy use, (2) the type of energy use, (3) energy conservation, and (4) the efficiency of energy use. We found that the EIS generally does not appear to address the issues of energy use, energy resources, or energy conservation associated with the alternatives considered and proposed mitigative measures.

More specifically, the EIS does not consider and specify the energy effects associated with the alternative timber management plans. Energy issues would, however, be affected by the alternatives in differing ways, some subtle and others more obvious. For example, the alternatives associated with greater road construction would generally require greater initial energy investment than those alternatives with little or no new road construction (it generally requires an investment of between 80 and 110 thousand Btu's per dollar cost of construction to build new roads). However, an alternative which provided for more extensive road construction might still be more energy efficient over the

long-term if it resulted in better efficiency of vehicle use (more direct routes, greater accessibility, etc.). Therefore, an optimum combination of initial energy investment (construction period) and long-term energy use should be sought. Such considerations should be added to Section 3.1. Note that if road surfaces and grade profiles vary, energy consumption is also influenced. The energy consumed for maintenance might also vary greatly between the alternatives, depending on the extent and design of rights-of-way, traffic volumes, and type of surfacing.

The EIS also does not presently include a consideration of the indirect energy effects of increased road construction, such as increased motorized recreation. The energy effects of the alternatives will differ due to the variation in recreational experiences they would provide (see Sections 8.1.7, 8.2.7, 8.3.7, 8.4.7, 8.5.7, 8.8.8). This consideration should be included in the Final EIS.

The relationship of energy use effects to employment effects of the alternatives should also receive consideration in the Final EIS. For example, it requires between 300 and 400 million Btu's to support one sawmill employee for twelve months. In contrast, new employees of the Forest Service would each require about 150 to 200 million Btu's per year in support of their job. Service employees (e.g., hotels, motels, cafes, sporting goods stores, etc.) would each require between 50 and 160 million Btu's per job per year. Since the alternative timber management plans would affect the Grants Pass area economy in different ways and result in different employment distributive impacts, the alternatives would indirectly affect energy use in the area. The energy effects of different employment distribution impacts should be considered (see Sections 3.3.5.2, 3.3.5.3, 8.1.12.2, 8.2.12.2, 8.3.12.2, 8.4.12.2, 8.5.12.2, and 8.8.13.2).

The herbicide treatment proposed in the EIS is another area where energy consumption and conservation could be considered.

More specifically, note that the use of helicopters to apply pesticides could be very energy consumptive; alternative application techniques could be worthy of consideration in order to better understand the energy use tradeoffs involved.

Similarly, a large energy investment is associated with the fuel oil proposed for use in diluting the six proposed pesticides. The investment for the proposed action is 6.41 billion Btu for the fuel oil carrier, approximately equivalent to the annual amount of fuel oil consumed by 60 new 1,700 square foot Pacific Northwest single family homes with oil furnaces. Further evaluation of alternative dilution mediums and pesticides could be warranted in order to more closely examine the associated energy tradeoffs.

Also note that use of petroleum-based pesticides will, in themselves, constitute an energy investment. This energy investment could be contrasted against the use of non-petroleum pesticides and biological pesticides in the Final EIS. Note that, in general, there are few more energy intensive products than inorganic and organic chemicals (in general, only steel products and bricks require a greater energy investment). Most inorganic and organic chemicals require about 200 thousand Btu's of energy per dollar value of chemicals purchased.

Similarly, use of renewable energy resources (solar, geothermal, etc.) and energy conserving materials, building designs, and construction techniques should be strongly considered for any new Forest Service buildings associated with the timber management plan alternatives.

We also encourage you to explicitly consider the energy resource effects of the alternatives, in addition to their energy consumptive effects. The EIS does not contain a consideration of any energy value of the biomass in the Josephine Unit. It might be possible that some salvage of forest residues and dead material for their fuel value could occur and be consistent with Forest Service environmental and timber management objectives and policies. If so, this should be noted (e.g., in Section 1.6.3).

Finally, we suggest that energy use be added to the discussion of adverse effects which cannot be avoided. Use of energy will also represent a resource commitment and should, therefore, be noted in Chapter 7. We also encourage inclusion of energy as a resource impacted by the Josephine Uni

Timber Management Plan in the impact comparison tables (Tables 8-2 and 8-4). The EIS should also indicate that measures will be taken to mitigate excessive or unnecessary energy consumption due to the implementation of the eventual proposed action.

This Office again thanks you for this opportunity to review and comment on your Draft EIS. We trust our comments will be helpful to you in the preparation of the Final EIS, and in your further consideration of the alternatives. We recognize that the energy impacts of the timber management alternative under consideration are often "hidden" yet pervasive. An absence of quantitative descriptions of the alternatives (e.g., miles and type of new road per alternative, cost of new road per alternative, etc.) has prevented this Office from being more specific in these comments.

If we may be of further assistance, however, please do not hesitate to contact Gilbert Haselberger, Director, Conservation Branch, or Frank Brown, Environmental Specialist on FTS 399-1746.

Sincerely,

Jack B. Robertson

Jack B. Robertson
Regional Representative

cc: Lee Johnson, External Affairs Officer, Region X, DOE

Robert Stern, Office of the Assistant Secretary for Environment, Environmental Impact Division, NDOE

Paul Brumby, Office of the Assistant Secretary for Conservation and Solar Applications, Federal Program Office, NDOE

Richard Worthington, Regional Forester, Region VI, Forest Service, USDA, Portland, Oregon

Don E. Campbell, Forest Supervisor, Department of Agriculture, Seattle, Washington

41

JOSEPHINE SUSTAINED YIELD UNIT

TEN YEAR TIMBER MANAGEMENT PLAN

Re: Department of Interior Draft Environmental Statement (Int. Des. 78-4)

It is our opion that not enough concern or recognition has been given to potential for production of forage on these federal lands.

It is our contention, in keeping with the multiple use concept, that all land, timber land included, be assessed and managed for its ability to produce forage. Also that domestic grazing systems be implemented to harvest this resource.

We further contend there are methods and that methods can and should be developed where by managed grazing plant communities can be used not only for production of red meat but to enhance timber production. Also to provide better forage and habitat for game animals and wild life, and control erosion of the soil.

This increased potential to produce red meat would improve the economic status of the local rancher - owner and provide justification for retention of private sector lands as economic units thereby improving the possibility of stabilization in the open space retention concern.

Public Lands Committee
Jackson County Stockmens Assn

Copy to
Oregon Cattlemens Assn

Ed Peck
Pres

Natural Resources Defense Council, Inc.

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PALO ALTO, CALIFORNIA 94306
415 327-1080

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WASHINGTON, D.C. 20005
202 737-5000

New York Office
122 EAST 42ND STREET
NEW YORK, N.Y. 10017
212 949-0049

May 5, 1978

45

Mr. Murl Storms
State Director
Bureau of Land Management
Oregon State Office
P.O. Box 2965
Portland, Oregon 97208

RE: Draft Environmental Statement, Josephine Sustained Yield Unit 10-Year Timber Management Plan

Dear Mr. Storms:

Attached are the comments of the Natural Resources Defense Council, Northwest Environmental Defense Center, Ada County Fish and Game League, California Trout, and Montana Wilderness Association on the above-captioned draft environmental impact statement (EIS).

We have concluded that the draft statement totally fails to comply with the National Environmental Policy Act of 1969 and the express terms of the settlement agreement entered into in NRDC v. Kleppe, Civil No. 75-1861 (D.D.C.). As described in the attached comments, we feel that the draft requires extensive revision if its final EIS is to fulfill its legal obligations.

Pursuant to our agreement with your office granting us an extension of time until May 8, 1978, to submit comments on the draft EIS, we understand that these comments are being submitted on a timely basis and will be reprinted in the final EIS on the Josephine Sustained Yield Unit. If you, your staff or members of the EIS team have any questions about our comments, we hope you will not hesitate to contact us.

Sincerely,

Helene Linker

Helene Linker

HL:ko
Enclosure
cc: Mr. Joseph C. Dose
Mr. Larry Williams
Mr. Ballard Jamieson, Jr.

Natural Resources Defense Council, Inc.

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415 327-1080

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WASHINGTON, D.C. 20005
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NEW YORK, N.Y. 10017
212 949-0049

COMMENTS

OF THE

NATURAL RESOURCES DEFENSE COUNCIL;

NORTHWEST ENVIRONMENTAL DEFENSE CENTER;

ADA COUNTY FISH AND GAME LEAGUE;

CALIFORNIA TROUT; AND THE

MONTANA WILDERNESS SOCIETY

ON THE

BUREAU OF LAND MANAGEMENT'S

DRAFT ENVIRONMENTAL STATEMENT

JOSEPHINE SUSTAINED YIELD UNIT

10-YEAR TIMBER MANAGEMENT PLAN

Submitted by

Helene Linker

May 5, 1978

The Natural Resources Defense Council, Inc. ("NRDC") submits these comments on the Bureau of Land Management's (BLM) Draft Environmental Statement, Josephine Sustained Yield Unit 10-Year Timber Management Plan, on behalf of itself, the Northwest Environmental Defense Center, the Ada County Fish and Game League, California Trout, and the Montana Wilderness Association. Based upon our review of the draft document, we have unfortunately concluded that the draft fails to comply with the requirements of the National Environmental Policy Act (NEPA). Accordingly, the draft is not an adequate environmental impact statement (EIS) for the Josephine Sustained Yield Unit (JSYU); nor is it an adequate model for future EIS's to be prepared on BLM timber lands in the Pacific Northwest.

Specifically, we have determined that the draft EIS is inadequate because 1) it fails to relate the proposed timber management action, as well as alternative land uses, to the Josephine Unit Management Framework Plan; 2) it fails to provide adequate and specific information on implementation of the proposed plan and adequate data to support adoption of that plan; 3) it fails to assess in adequate detail the environmental impacts that will result from the implementation of the proposed action; 4) it fails to describe adequately measures to mitigate the adverse impacts; and 5) it fails to consider available and viable alternatives to the proposed action as required by law. The net result is that the draft EIS fails to provide a basis for rational decision-making as to the amount of timber to be cut

in the JSYU and the appropriate management of that timber harvesting.

I. Background.

This EIS is being prepared as a result of the settlement of litigation in Natural Resources Defense Council v. Kleppe, Civil No. 75-1861 (D.D.C.).[1/] In that suit, NRDC challenged the BLM's failure to comply with NEPA and prepare EIS's on the management of timber lands in the Pacific Northwest. As a result of the settlement entered in that litigation, the BLM agreed to prepare EIS's on fifteen sustained yield units in the Pacific Northwest as well as environmental assessment records (EAR's) on timber management programs in a number of public demand sustained yield units. The Josephine Unit EIS is the first in the series of EIS's to be prepared by the BLM under the terms of the settlement agreements. As such, it will serve as a model for future EIS's on BLM timber lands.

The specific terms of the settlement agreement entered in NRDC v. Kleppe required that the EIS's would contain all the information required by NEPA. In addition, the settlement agreement specified that the EIS's would contain an analysis, in detail, for each of the sustained yield units including:

1/ The litigation was settled in two phases. Settlement agreements were entered into on February 19, 1976 and May 3, 1976.

> " (1) The total public land acreage proposed to be devoted wholly and/or partially to timber production, <u>including land use alternatives considered in reaching this proposal</u>. The limitations placed on timber harvesting and related management and regulatory practices in order to maintain other forest land values will be identified. (emphasis added)
>
> (2) The annual volume of timber harvest proposed to be offered from the acreage described under (1) above, including an explanation of why this volume is consistent with principles of sustained yield and a description of alternative levels of timber harvest that were considered. The volume proposal will indicate the differing mix of silvicultural methods needed to carry out the proposal, such as thinnings, fertilizations, and harvest techniques." 2/

II. <u>The Draft is Inadequate Because it Fails to Set Forth the Recommendation of the Josephine Unit Management Framework Plan and to Evaluate That Plan's Adequacy and Utility</u>.

The draft EIS is inadequate because it focuses its analysis exclusively on timber harvesting practices without consideration of other land use alternatives and without consideration of the overall planning goals for the JSYU. While the draft EIS recognizes that "[t]imber management is only one component of the Bureau's forest management effort in the JSYU" [p. F-3], it goes on to state that "[t]his statement does not explicitly address itself to those practices or actions carried out for the specific interest

---

2/ Partial settlement agreement of February 19, 1976 at 5; settlement agreement of May 3, 1976 at 3.

of other forest values or uses"[p. F-3]. The draft EIS inappropriately relegates this more comprehensive analysis of land uses for the JSYU to the province of the Management Framework Plan ("MFP") which sets forth overall management guidelines to coordinate specific action plans [p. 1-66].

This failure to assess in the draft EIS in detail the overall goals for the JSYU and alternatives to timber management is inappropriate for a number of reasons. First, the draft EIS gives no clear indication whether the MFP for the JSYU has in fact been completed and no indication of how this timber management plan comports with overall land use objectives. The draft EIS suggests that the general planning goals of the MFP have not yet been finalized, stating "[w]hen final MFP decisions are made, they will form the management guidelines within which specific action plans are formulated" [p. 1-66]. Later, however, the EIS indicates that the MFP has in fact been completed and that the timber management plan proposed in the draft EIS is consistent with it. The draft EIS states "[t]he proposed timber management plan was evolved with the Bureau's planning system ... the proposed action, therefore, is both compatible with BLM programs and consistent with the major goal of timber management" [p. 1-85].

The status of the MFP, and the overall planning goals for the JSYU, should be made perfectly clear in the draft EIS. If in fact no MFP final goals have been set, it is then premature to be

considering specific implementation plans such as the timber management plan addressed in the draft EIS. Moreover, such out of phase analysis would violate the BLM's own regulations which require MFP completion prior to development of specific action plans. If the MFP has been finalized, and the overall goals for the unit clearly defined, then the draft EIS must set forth with specificity the goals, objectives, and constraints of the MFP. Unless the goals of the MFP are first clearly developed and clearly discussed within the EIS, one cannot determine how the timber management program of the draft EIS relates to those overall goals and whether it is in fact consistent with the MFP guidelines.

In addition to setting forth the specific recommendation of the JSYU MFP, the draft EIS must evaluate the degree to which the MFP has fulfilled its functions. To do so, it must evaluate the data base on which the MFP was prepared. It should determine if conflicts between various resource uses were adequately identified and resolved. It should assess alternative land uses to those adopted by the MFP. Moreover, it should determine whether the standards and guidelines established by the MFP are sufficiently precise to provide a basis for the subsequent development of detailed activity plans. Finally, the impact statement should determine whether the MFP requires revision.

This thorough evaluation of the adequacy of the MFP within the JSYU EIS is essential because no EIS was prepared in conjunction

with the development of the MFP guidelines. Thus, the full range of impacts resulting from implementation of the MFP and the propriety of alternatives to the guidelines outlined therein has never been assessed.

The draft EIS cannot therefore assume its single timber harvest focus as it currently does, but must evaluate alternative land uses to timber production. This obligation to consider alternative land uses was made clear in the express terms of the settlement agreement [3] and was reiterated in correspondence between the BLM and NRDC.[4] While the BLM suggested it would evaluate alternative land uses considered in reaching the final proposal, in Chapter 1 of the EIS, rather than in the alternatives section, [5] Chapter 1 of the draft EIS fails to realistically assess land use alternatives to timber production. Rather, the draft assumes that the focus of the EIS is timber management and discusses alternative land uses, such as recreation, aesthetics, minerals, wildlife, water quality, livestock forage "only in terms of how they are impacted by or impact timber management practices" [p. F-3].

3/ See discussion, supra, § 1 at 2-3.

4/ Letter from Mr. Ballard Jamieson, Jr. of NRDC to Mr. Joseph C. Dose, Chief, Division of Forestry, BLM [June 17, 1976].

5/ Letter from Joseph C. Dose, Chief, Division of Forestry, BLM, to Mr. Ballard Jamieson, Jr. and Mr. John D. Leshy [July 20, 1976].

III. The Draft EIS Fails to Describe Adequately the Proposed Plan.

The draft EIS is inadequate because the proposed plan is described in generalities, and does not give the reader complete information as to specific actions that will be taken, the location for implementing these actions, and the sequence of these events. Much of this information could be provided by additional maps and charts. Figure 1-1 gives only a most general breakdown of planned cut areas, high intensity and low intensity acreage, and planned road developments. Additional maps and charts should be included in the EIS laying out the acreage distribution for the various soil classifications enumerated in Appendix D and showing how these soil characteristics relate to the timber production capabilities of the lands outlined in Figure 1-1. Additional maps should also show the location of lands that will be subject to herbicide treatment, as well as the location or expected location for endangered wildlife species and vegetation.

It would also be useful to the reader to have a table or chart which clearly portrays exactly what part of the JSYU will be involved in timber production. The chart would set out the total area of the JSYU, the total area of public lands as they break down into high intensity, low intensity and limited forest management, and the percentage of JSYU lands in each of the classifications. For example, the chart should indicate the following:

	Acreage	Percent
Total Area of Josephine Sustained Yield Unit	856,844	----
Total Area of Public Land	425,720	49
Total Area Classed for Timber Management	358,042	84
High Intensity Forest Management Lands	222,896	62
Low Intensity Forest Management Lands	55,675	16
Limited Forest Management Lands	79,471	22

Finally, the EIS should contain a map indicating the general progression of cuts, road developments, and herbicidal spraying the proposed action entails and the timetable for these events. Only by setting forth this additional data in clear and understandable terms will the reader of the draft EIS be provided with the full picture of the proposed action and the sequence of events.

IV. The Draft EIS Fails to Provide Sufficient Data to Assess the Validity of Proposed Actions That are Defined.

The draft EIS is deficient because the descriptive information supporting individual components of the portions of the proposed plan that are set forth in the document is based on incomplete or unexplained data. The discussion does not permit the reader to independently evaluate the individual decisions or assertions. For example, the data underlying the allocation of acreage to low intensity management land on an experimental basis seems to be both

insufficiently evaluated and inadequately discussed. The description of the various land inventories performed leaves the reader to conclude that extensive, rather than an intensive, land inventory was utilized in designating low intensity timber management lands [p. 1-12 through 1-17]. Since an extensive inventory evaluates only a small portion of the plots on the ground and extrapolates from these findings to make a general estimate of low intensity lands, the error of margin for such an inventory is great. However, a precise determination of the timber production capabilities of the lands is essential in allocating different timber management techniques. The land capabilities should be identified by an intensive, on-the-ground survey before allocation is made to high or low intensity management. If in fact such an intensive inventory was performed on low intensity lands in the JSYU, the draft EIS should be revised to make this clear.

Second, the data provided in the draft EIS on the regeneration period reasonably necessary for this low intensity land is too speculative to justify the large "experimental" cutting program the BLM now proposes. The draft EIS says only that the regeneration period for low intensity land is "expected to be in excess of five years after clear-cutting or after the regeneration cut of a shelter wood regime" [p. 1-8]. Additional data on the actual regeneration period must be provided before the BLM can justify its proposal to cut approximately 500 acres of low intensity lands per year. If, in fact, the low intensity land

management is to be an experiment, and additional data on the regeneration period and efficacy of reforestation programs on these low intensity lands still needs to be compiled, it would be more appropriate if a smaller number of acres, perhaps 50 to 100, were harvested each year while the specific information was being accumulated.

Similarly, the data provided to support the BLM's fertilization program and predicted benefits of that program is inadequately explained. The BLM proposes to fertilize 22,300 acres and estimates a 22 percent growth gain from that fertilization project. The draft EIS, however, does not tell the reader whether fertilization experiments to support this estimated growth increase were done on soil types typical of the Josephine Unit. Since the soil characteristics of Northwestern Oregon are different from those in Josephine County, experimentation on these different soil types would not provide a sound basis for extrapolation. The draft EIS should therefore be revised to make clear where the soil studies supporting the fertilization program were done and whether the soil was typical of Josephine County soil types. If no such site-specific fertilization studies have in fact been performed, it is premature to estimate the substantial growth gain that would result from a fertilization program in the JSYU.

Third, additional data is needed to explain why the proposed action entails a two-stage shelterwood cut rather than a three-stage shelterwood harvest. The draft EIS indicates only that

in the past, a three-stage system was used, but that two-stage shelterwood harvest appears more appropriate now. Since the two-stage cut results in a larger harvest over a shorter period of time, the impacts can be significant. The draft EIS should be revised to explain to the reader why the decision to utilize a two-stage shelterwood cut was made, what are the expected benefits over a three-stage shelterwood cut, and what studies have been done to support these projections.

V. The Draft EIS Fails to Give a Full and Thorough Assessment of the Environmental Impacts That Will Result in the Josephine Sustained Yield Unit from Implementation of the Proposed Actions.

The draft EIS's discussion of impacts of the proposed action is inadequate because 1) it fails to provide a full and thorough discussion of the impacts that will result from the project, 2) it fails to relate the potential impacts to the specific lands in the JSYU, and 3) it fails to assess the cumulative impacts that will result from the proposed action. Most noticeably deficient is the discussion of the impacts expected from the development of the transportation system within the JSYU and the implementation of the herbicide program.

While the draft EIS lays out information concerning how many miles of road will be constructed, reconstructed, paved, and maintained, the specific impacts of this construction project are never related to the fish, wildlife, recreation and aesthetic

uses within the JSYU. In addition, the draft EIS's discussion of the impacts of road construction on sedimentation in the JSYU streams is both confusing and inadequate. At one point, the draft EIS states, "it is not known how much sediment will be contributed to the JSYU streams by logging and road construction" [p. 3-125]. Elsewhere, the draft EIS suggests that " ... the total sediment yield on the JSYU would decrease by 5 percent from the existing level, since the proposed action represents a decrease in the allowable cut" [p. 3-53]. The draft EIS should clearly state whether or not the sedimentation impacts from road construction are in fact known. If not, the draft EIS should indicate what additional data is needed to compile this impact information. If the actual impact is known, the draft EIS should specifically relate that material to the water quality of the JSYU.

Similarly, the discussion of the herbicide program fails to give the reader a concrete feeling for impacts that will be experienced in the JSYU. The herbicide impact discussion is full of generalities of past studies on potential herbicide toxicity. Nowhere are these studies related to the specific aspects of the herbicide program as it will be carried out in the JSYU and the specific impacts this program will have on fish, wildlife, recreation and water quality within the JSYU. Rather, a thorough analysis of the herbicide program seems to have been deferred to a later date when individual treatment decisions will be made [p. 1-5]. Since herbicide treatment

appears to be a major component of the timber management plan for the JSYU, its anticipated impacts must be explained in detail now in the overall timber management planning stage.

The draft EIS's discussion of the impacts of the proposed action on the special resources of the JSYU such as the endangered wildlife species, endangered vegetation and Rogue Wild and Scenic River is particularly weak. The draft EIS does not establish with any specificity how and to what extent endangered wildlife species and vegetation occurring within the JSYU will be impacted. A large part of the problem appears to lie in the absence of an underlying detailed inventory of endangered vegetation and endangered species within the JSYU. Without this specific information the draft EIS itself acknowledges that endangered species or vegetation "could occur on any site that would be affected by the proposed timber management plan" [p. 3-102]. Against this framework, it is virtually impossible to predict with any specificity the impacts on this vegetation or animal life.

Concerning the Rogue Wild and Scenic River, the draft EIS baldly asserts that "[t]here are no significant impacts anticipated which would endanger the environmental integrity or recreational values of the Rogue Wild and Scenic River" [p. 3-223]. However, there are many activities in the proposed action that could have a dramatic adverse impact upon the river. These activities include herbicidal spraying, forest cover removal, and road construction that could have a particular impact on the river's

sedimentation and bed load capacities, water quality and water flow characteristics. Such potential impacts require further definition and exploration within the draft EIS.

Finally, the draft EIS's discussion of impacts resulting from the proposed action is inadequate because the discussion fails to assess the cumulative impacts of the proposed project. Cumulative impacts should be assessed from two distinct perspectives. First, the cumulative impact of any single management alternative that will be implemented independently within the JSYU by the BLM, the Forest Service, and any private land owners, should be evaluated. Thus, for example, cumulative impacts that may result from slash burning by the U.S. Forest Service, private industry, and the BLM within the JSYU should be evaluated as a whole. This overall assessment might lead the BLM to draw a different conclusion than that currently set forth in the draft EIS, that the burning of trash will produce negligible impacts [p. 3-14]. Secondly, the cumulative impacts of the various components of the BLM's own timber management program must be assessed. Without this cumulative assessment, the reader and decision-maker are given no picture of the overall impacts of the timber management program. Thus, no rational decision as to its efficacy can be made.

VI. The Draft EIS's Discussion of Mitigation Measures is Wholly Inadequate.

The draft EIS has virtually ignored a discussion of mitigation measures, although the discussion is essential for compliance with NEPA. Rather, the draft EIS's separate discussion of mitigation measures consists of a blank page which refers the reader to a discussion of mitigation measures in Section 1.6 of the project design [p. 4-1]. In turn, the project design discussion in Section 1.6 totally fails to provide an adequate analysis of mitigation measures.

Although the lack of specificity in the draft EIS's discussion of anticipated impacts makes it more difficult to identify what mitigation measures are necessary and feasible, the impacts discussion does point to some general adverse consequences that will result from the proposed project and that could and should be assessed further in the mitigation section of the document. For example, Chapter 3 of the draft EIS indicates that cutting of old growth timber will have adverse effects on wildlife whose natural habitat will be destroyed. A mitigation measure that should be considered and that is noticeably absent is the possibility of leaving selected old growth trees to provide natural habitat. Similarly, Chapter 3 of the draft EIS suggests that herbicide spraying will have some adverse effects on stream quality. Although some measures to minimize this adverse water quality impact are

discussed, a number of reasonable additional mitigation measures have not been assessed. Such mitigation measures might include establishment of specific and adequate distances from the streams for both the washing of herbicide spray tanks and the loading and mixing of the chemicals. The general failure to discuss mitigation measures in detail suggests that the BLM has addressed the draft EIS as a document to support an accepted plan, rather than a planning instrument to review a proposed action and consider modifications in that proposal.

VII. The Alternatives Discussion of the Draft EIS is Inadequate.

Chapter 8 of the draft EIS, which discusses alternative plans of action, is fundamentally deficient because 1) it fails to discuss reasonable alternatives to the proposed timber management plan; 2) it fails to assess alternative site-specific timber management options; and 3) it focuses instead on unrealistic alternatives.

The draft EIS alternatives discussion is inadequate because it fails to set out or appraise alternatives to timber management. There is no realistic or thorough discussion of utilization of the land for wildlife, range, recreation or wilderness. Instead, timber production is assumed as a goal for the JSYU and the alternatives deal only with various methods of achieving that timber production. As previously noted,[6]

6/ See discussion supra, Section II at 5-6.

it is essential that the draft EIS consider alternative land uses in detail, since only an analysis of the trade-offs and benefits of various land uses will allow the reader and decision-maker to determine the most desirable land allocation. As currently drafted, the EIS gives no assurance that alternatives to timber management have ever or will ever be thoroughly evaluated.

Within the timber management context, the draft EIS's discussion of alternatives is inadequate because it fails to consider alternative site-specific options for timber management. The site-specific options that should be discussed include, for example, more selective removal of old growth timber than is currently evaluated in the proposed plan or in the alternatives; elimination of clear-cutting as a harvesting option for the JSYU or minimization of clear-cutting; utilization of three-stage shelterwood cutting in all or part of the JSYU; and designation of buffer strips along streams extending for a quarter of a mile rather than 200 feet as assumed in the proposed plan. Evaluation of these site-specific environmental options would allow members of the public and members of the agency to evaluate actual on-the-ground environmental impacts of timber management decisions and reasonable alternatives thereto. Without this detailed analysis, one can only take on faith the BLM's assertion that the proposed timber management plan of action is the most desirable.

In lieu of the alternatives that should be assessed within the draft EIS, Chapter 8 instead focuses on a number of unrealistic and unreasonable alternatives. Alternative 1, for example, claims to consider an option of no timber management combined with wilderness designation. In view of the past management of the JSYU, however, no one seriously believes that the BLM's timber management program in the unit will be totally discontinued. The crucial decisions for the unit are how much and which lands will be designated as available for commercial timber management, how much timber will be cut annually, and how the timber will be harvested and removed from the forest. Thus, focusing on alternative 1 as now constituted does little to inform the reader of a viable option for management of the JSYU.

In addition, alternative 1 is defective because it attempts to lump as one option a no timber management option and an overall wilderness appraisal. Alternative 1 suggests that the entire JSYU should be considered for wilderness designation. Again, this is not a realistic option. No one contends that the entire unit would be or should be appropriate for wilderness designation. Rather, a thorough and meaningful assessment of a wilderness alternative would require identification of the specific portions of the land that could qualify for wilderness designation. Once these identifications have been made, a wilderness alternative should discuss the impacts

that will result from leaving these parcels or portions of these parcels as untouched wilderness lands. Alternative 1 is wholly lacking in any of this detailed type of assessment for wilderness potential. It therefore misleadingly represents to the reader that wilderness has been considered as an option for the JSYU when in fact no such thorough consideration has been given.

A detailed discussion of the wilderness alternative is particularly important in the JSYU EIS, since as pointed out in the draft EIS it appears that a wilderness option could not be adopted without legislation to amend the O & C Lands Act, 43 U.S.C. § 1181a [p. 8-3]. To give real consideration to wilderness and any validity to a potential legislative change, the specific details, benefits and drawbacks of any wilderness option for the JSYU must be evaluated in detail.

Similarly, alternatives 4 and 5 represent unrealistic options for timber management. Both of these alternatives discuss significantly increased removal of old growth timber. Such rapid removal of old growth as suggested by alternatives 4 and 5 would appear to violate the policies of sustained yield and even flow that govern the BLM's timber management practices. Thus, it is irresponsible and unsound environmental analysis to propose as a "viable" option, timber management practices that cannot and should not be implemented. The BLM alternatives should focus on reasonable and implementable

options, not on proposals that are contrary to law and the fundamentals of good forest management.

Conclusion

In conclusion, we have found upon review that the draft EIS is fundamentally inadequate. It fails to include the specific goals and constraints of the JSYU MFP, and to assess the adequacy of that document as a land use plan for the area. Moreover, it fails to describe with sufficient specificity the actual timber management plan that is proposed or the data and rationale for selecting that particular timber management option. The draft further fails to provide a full assessment of the impacts that can be anticipated as a result of the proposed action and mitigation measures necessary to minimize the environmental impacts of that action. Finally, the draft is deficient because it fails to assess a full range of realistic alternatives while concentrating on unreasonable proposals. We urge the BLM to revise the draft EIS and remedy these serious deficiencies in the final EIS on the Josephine Timber Management Plan.

Advisory Council on
Historic Preservation
1522 K Street N.W.
Washington, D.C. 20005

May 8, 1978

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Mr. Murl W. Storms
State Director, BLM
P. O. Box 2965
Portland, Oregon 97208

Dear Mr. Storms:

Thank you for your request of March 1, 1978, for comments on the draft environmental statement (DES) for the Josephine Sustained Yield Unit Ten Year Timber Management Plan, Oregon. Pursuant to Section 102(2)(C) of the National Environmental Policy Act of 1969 and the Council's "Procedures for the Protection of Historic and Cultural Properties" (36 CFR Part 800), we have determined that:

--your DES mentions properties of cultural and/or historical significance; however, we need more information in order to evaluate the effects of the undertaking on these resources. Please furnish additional data indicating:

Compliance with Section 106 of the National Historic Preservation Act of 1966 (16 USC 470f, as amended, 90 Stat. 1320).

The environmental statement must demonstrate that either of the following conditions exists:

1. No properties included in or that may be eligible for inclusion in, or determined on the authority of the Secretary of the Interior to be eligible for inclusion in, the National Register of Historic Places are located within the area of environmental impact, and the undertaking will not affect any such property. In making this determination, the Council requires:

--evidence that you have consulted the latest edition of the National Register (Federal Register, February 7, 1978, and its monthly supplements);

--evidence of an effort to ensure the identification of properties eligible for inclusion in the National Register, including evidence

The Council is an independent unit of the Executive Branch of the Federal Government charged by the Act of October 15, 1966 to advise the President and Congress in the field of Historic Preservation.

of contact with the State Historic Preservation Officer, whose comments should be included in the final environmental statement. The State Historic Preservation Officer for Oregon is Mr. David G. Talbot, State Parks Superintendent, 300 State Highway Building, Salem, Oregon 97310.

2. Properties included in or that may be eligible for inclusion in or determined on the authority of the Secretary of the Interior to be eligible for inclusion in the National Register of Historic Places are located within the area of environmental impact, and the undertaking will or will not affect any such property. In cases where there will be an effect, the final environmental impact statement should contain evidence of compliance with Section 106 of the National Historic Preservation Act through the Council's "Procedures for the Protection of Historic and Cultural Properties" (36 CFR Part 800).

In the absence of the above data the FES should, minimally, demonstrate that the Bureau of Land Management plans to identify cultural properties prior to ground-disturbing activities and that the steps detailed in the Procedures will be complied with as appropriate.

Should you have any questions, please call Brit Allan Storey at (303) 234-4946, an FTS number.

Sincerely yours,

Louis S. Wall

Louis S. Wall
Assistant Director, Office of
Review and Compliance, Denver

APPENDIX N

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APPENDIX O

GLOSSARY OF TERMS

A-weighted sound scale - A sound scale with sound pressure level deemphasizing lower frequencies and slightly emphasizing frequencies between 1000 and 5000 Hz. The A-weighting curve is designed to simulate the human hearing mechanism's frequency response.

acquired lands - Lands, or interest in lands, purchased by the United States and managed as public lands.

allowable cut - The amount of forest products that may be harvested annually or periodically from a specified area over a stated period in accordance with the objectives of management.

allowable cut effect (ACE) - The immediate increase in today's allowable cut which is justified by expected future increases in yields due to present or proposed management treatments.

allowable cut planning system - A process which deals with the steps involved in the development and evaluation of alternative levels of timber production for the purpose of establishing an allowable cut.

anadromous fishes - Fishes which migrate from the sea to breed in fresh water. Their offspring return to the sea.

angler day - An angler day as defined by the Oregon Department of Fish and Wildlife is any angler visit during one day for the purpose of fishing.

animal unit - One mature cow, one horse, five sheep, six deer, or equivalent numbers of other herbivorous species.

animal unit month (AUM) - The amount of forage (of any combination of vegetative species) necessary for the subsistence, in a healthy state, of one mature cow (and calf under six months) for a period of one month.

AQCR - Air quality control region, State of Oregon.

AQMA - Air quality management area, State of Oregon.

archeology - The scientific discipline responsible for recovering, analyzing, and interpreting the unwritten portion of man's historic and prehistoric method, thus contributing to our understanding of the present and to our ability to prepare for the future.

archeological resources - All evidences of past human occupations other than historical documents, which can be used to reconstruct the lifeways of past peoples. These include sites, artifacts, environmental data, and all other relevant information.

aspect - The direction a slope faces.

average employment - The sum of number of employees, reported monthly, divided by twelve. Because employment is reported for all employees working during any one month, it is a modest over-estimate of full-time equivalent employment.

avian - Pertaining to birds.

background levels - Amounts of pollutants present from natural sources and from human-made disturbances which have reached equilibrium.

biome - A biotic community which covers an extensive geographic area with characteristic life forms and climax species of plants and animals. Sub-biomes are minor geographic divisions within a biome.

biotic community - Any assemblage of populations (both plant and animal) living in a prescribed area or physical habitat.

board foot - A unit of solid wood, one foot square and one inch thick.

bucking - Cutting trees into log lengths.

Bureau planning system - A process used in the BLM to establish land use allocations, constraints and objectives for various categories of public land use.

carcinogen - Any substance that produces cancer.

chain - A unit of length equal to 66 feet.

Class I Streams - Waters designated by the State of Oregon as valuable for domestic use, important for recreation or significant for the reproduction of fishes.

Class II Streams - Waters designated by the State of Oregon as headwater streams or minor drainages that generally are of limited or no value for fishing or other forms of recreation.

Class II Inventory - A cultural resource inventory based upon the identification and evaluation of all cultural resources in a portion of an area which will permit an estimate of the nature and distribution of cultural resources of the entire area.

Class III Inventory - An intensive field inventory designed to identify and evaluate, from surface and exposed profile indications, all cultural resource sites within a specified area (usually a project area).

clearcutting - A method of timber harvesting in which all trees, merchantable or unmerchantable, are cut from an area.

climatic climax community - A climatic climax community is one in which the community is in equilibrium with the general climate.

climax community - The final community which develops following a successional series. Theoretically, the climax community represents an equilibrium between community production and consumption.

coefficient of variation - A measure of variability that is expressed in percentage terms (it is independent of magnitude): It is the standard deviation of the variable divided by the mean for the variable.

commercial forest land - Forest land that is now producing or is capable of producing at least 20 cubic feet per acre per year of commercial coniferous tree species.

commercial thinning - Removal of merchantable surplus trees.

community income effect - The sum of direct and indirect personal income generated by a change, e.g., timber harvest. Indirect personal income results from economic activity stimulated in other local enterprises by purchase of goods and services, primarily of a support nature.

contrast rating - A method of determining the extent of visual impact for an existing or proposed activity that will modify any landscape feature.

covered employment - As reported by the State of Oregon Employment Division for employees "covered" by the State Unemployment Insurance Law, excludes self-employment, agricultural, domestic, and other laborers whose employment is occasional or compensation is by commission.

cull - A tree or log which is rejected because it does not meet certain specifications.

decibel (dB) - A logarithmic measure of sound pressure.

discharge - Rate of flow, specifically fluid flow; a volume of fluid passing a point per unit of time, commonly expressed as cubic feet per second, mission gallons per day, gallons per minute, or cubic meters per second.

ecosystem - An ecological unit consisting of both living and nonliving components which interact to produce a natural, stable system.

ecotone - The transition zone between two adjacent communities.

environmental assessment report (EAR) - A systematic environmental analysis of site specific BLM activities. Used to determine whether such activities have a significant affect on the quality of the human environment and whether a formal environmental statement is required.

environmental statement (ES) - A formal document to be filed with the Environmental Protection Agency which considers environmental impacts to be expected from implementation of a significant Federal proposal.

falling/felling - Cutting down trees.

fauna - All the animals in a given area.

final harvest cut - Constitutes removal of a mature stand; either through clear cutting, the final stage of a shelterwood regime, or overstory removal.

fire-induced community - A plant community which develops following fire. The community may be dominated by individuals which are resistant to fire or by young plants which have sprouted following fire.

fire-dependent ecosystem - An ecosystem kept at a permanent stage of disclimax by fire disturbance.

flora - All the plants in a given area.

forbs - Herbaceous plants. Most often used pertaining to herbaceous plants eaten by wildlife.

forest land - Land that is now, or is capable of becoming, at least 10 percent stocked with forest trees and has not been developed for non-timber use.

forest management program - Includes timber activity plan and all forest resource related program activity plans.

frequency - The number of oscillations per second of a sound; pitch. A sound can, of course, contain more than one frequency.

gross yarding - yarding unmerchantable logging residue to the concentration points.

groundwater - Subsurface water in the zone of saturation.

growing stock - The amount of standing, green timber retained to produce forest products. Also known as forest capital.

habitat - The environment in which an organism occurs.

hertz - A measure of sound frequency equal to one cycle per second.

high intensity forest management lands - All commercial forest land that is part of the timber production base for allowable cut calculation in the Josephine Sustained Yield Unit.

indicator plant species - A plant that, by its occurrence, vigor or frequency, indicates a particular property of a site. Soil type generally, but not exclusively, is the controlling site factor.

intermediate cuttings - Any removal of merchantable trees from a stand which occurs prior to the final harvest cutting,i.e., commercial thinning, sanitation/salvage, or shelterwood regeneration cuttings.

instant wilderness study area - One of 55 primitive or natural areas formally identified prior to November 1, 1975. These areas are subject to wilderness study reports to be submitted by July 1, 1980.

international log rule - A log rule derived from a formula which allow a 1/2-inch taper for each 4 feet of log length and 1/16-inch shrinkage for each one-inch board. In one form it assumes a 1/8-inch saw kerf (International 1/8-inch Log Rule) and in a modified form it assumes a 1/4-inch saw kerf (International 1/4-Log Rule).

inversion (temperature) - The state of the atmosphere in which a layer of cold air is trapped near the earth's surface by an overlaying layer of warm air; may contribute to serious air pollution problems.

invertebrate - An animal without a segmented bony or cartilaginous spinal column. (Arthropods and lower phyla).

labor force/population ratio - is the quotient of labor force for a county as reported by the State of Oregon Employment Division, divided by population, as reported by Portland State University Center for Population Research and Census. The ratio is used in inferring average resident population dependent upon each job.

landing - Any place on or adjacent to the logging site where logs are assembled for further transport.

landscape character - The arrangement of a particular landscape as formed by the variety and intensity of the basic elements of form, line color and texture.

latitudinal migration - A form of animal movement which involves a change of latitude. Latitudinal migration may traverse any distance from a few miles to nearly trans-polar (as is the case with some species of birds).

log flows - destinations of harvested timber by origin. Origins used herein are management units (e.g., Josephine Sustained Yield unit) and counties or county groupings. Destinations are communities, counties or groupings of counties within which the primary processing of timber takes place.

log rule - A procedure for estimating the board foot volume of logs of given length and diameter.

low intensity forest management lands - Commercial forest lands withdrawn from the timber production base since the regeneration period is expected to exceed five years. Included in the proposal for trial harvest.

lumber and wood products, except furniture - Defined by the Office of Management and Budget the Standard Industrial Classification Manual as Major Group #24, which includes logging contractors engaged in cutting timber and pulpwoods; merchant sawmills, lath mills, shingle mills, planing mills, plywood mills and veneer mills engaged in producing limber and wood basic materials; and establishments engaged in manufacturing finished articles made entirely or mainly of wood or wood substitutes. Certain types of establishments producing wood products are classified elsewhere, e.g., furniture and office and store fixtures are classified in Major Group #25.

Management Framework Plan (MFP) - Land use plan for public lands which provides a set of goals, objectives and constraints for a specific planning area to guide the development of detailed plans for the management of each resource.

migrant bird (transient) - A species which is ephemerally present only during migration and neither breed nor winter in the area.

morphology - The structure and form of an organism.

mortality-salvage - (see sanitation/salvage cutting).

multiple use - Management of the public lands and their various resource values so that they are utilized in the combination that will best meet the present and future needs of the American people.

mutagen - A mutation inducing agent. Any agent that tends to increase the occurrence of extent of mutations.

National Register of Historic Places (National Register) - Established by the Historic Preservation Act of 1966, the Register is a listing maintained by the National Park Service of architectural, historical, archeological, and cultural sites of local, state or national significance. Sites are nominated to the Register by the states and by Federal agencies. Copies of the National Register are available from the Superintendent of Documents, USGPO, Washington, D.C. 20402.

niche - The position or status of an organism within its community and ecosystem.

non-commercial forest land - Land which is not capable of yielding at least 20 cubic feet of wood per acre per year of commercial species, or land which is capable of producing only non-commercial tree species.

non-forest land - Land that has been developed for non-timber uses or land that is incapable of being 10 percent stocked with forest trees.

O&C Lands - Public lands granted to the Oregon and California Railroad Company and subsequently revested to the United States.

octave band sound pressure level - The sound pressure level of that portion of the total sound which lies between a band of frequency whose highest component is double that of the lowest frequency component, for example, 707 and 1414 Hertz.

operations inventory - An intensive forest inventory which provides managers with information showing the location, acreage, silvicultural needs, mortality-salvage or thinning needs within each section of public land.

paleontology - A science dealing with the life of past geological periods as known from fossil remains.

paper & allied products - This major (SIC) group includes the manufacture of pulps from wood and other cellulose fibers; the manufacture of paper and paperboard; and the manufacture of paper and paperboard into converted products such as paper bags, paper boxes, and envelopes.

partial cutting - Tree removal other than by clearcutting.

permeability - The capacity to transmit a fluid, measured by the rate of movement of a fluid of standard viscosity through material in a given interval of time under a given hydraulic gradient.

permeability (of soil) - The quality of a soil horizon that enables water or air to move through it. The permeability of a soil may be limited by the presence of one nearly impermeable horizon even though the others are permeable.

personal income - The income received by all individuals in the economy from all sources. It is made up of wage and salary disbursements, proprietors income, rental income of persons, dividends, personal interest income, and the difference between transfer payments and personal contributions for social insurance.

phytoplankton - Suspended, floating or weakly swimming microscopic aquatic plants.

Planning Area Analysis (PAA) - A planning document which analyzes the relationship of social and economic data to the physical and biological data presented in a Unit Resource Analysis (URA).

plant community - An association of plants. Plants of various species are found growing together in different areas with similar site characteristics.

precommercial thinning - Removal of surplus trees in a stand prior to their reaching merchantable size.

protective shelterwood system - A multi-stage partial cut system which takes a longer period of time between final harvest cycles than which is customary in shelterwood systems.

public lands - Any land and interest in land owned by the United States within the several States and administered by the Secretary of the Interior through the Bureau of Land Management. May include public domain, O&C, or acquired lands in any combination.

public domain lands - Original holdings of the United States never granted or conveyed to other jurisdictions.

recharge - Process by which water is added to the zone of saturation, as in recharge of an aquifer.

reforestation - Reestablishment of a tree crop on forest land.

regeneration - The renewal of a tree crop, whether by natural or artificial means. Also, the young crop itself.

regeneration cut - One of the phases of shelterwood cutting designed to open the canopy of a stand sufficiently to allow the establishment of regeneration, i.e., either the first stage of a two-stage shelterwood cutting or the second stage of a three-stage shelterwood cutting.

regeneration period - The time it takes for a new coniferous timber stand to become established following the final harvest cut.

riparian - Pertaining to natural communities which develop on or near the banks of a body of water.

sanitation/salvage cutting - Removal of individual trees killed or injured by fire, insects, disease, etc., and the removal of those trees likely to die prior to final harvest cut so as to utilize merchantable material.

savanna - A grassy expanse with scattered clumps of trees.

sawlog - A log considered suitable in size and quality for producing sawn timber.

SCA - Special Control Area, State of Oregon

scarification - Disturbance of the upper soil layer by mechanical means in preparing a site for seeding or planting.

scenic quality - The quality of the scenery as determined through the use of the scenic evaluation process.

Scribner Decimal C Log Rule - A derivation of the Scribner Log Rule whereby volumes are rounded to the nearest ten board feet and are listed in tens of board feet (volumes given in a table of this rule must be multiplied by 10 to obtain the actual board foot content).

Scribner Log Rule - A log rule constructed from diagrams which show the number of 1-inch boards which can be drawn in a circle representing the small end of a log. The Scribner rule assumes a 1/4-inch saw kerf, makes a liberal allowance for slabs, and disregards taper.

sensitivity level(s) - An index of the relative importance or volume of visual response to an area in relation to other areas in the planning unit.

shelterwood cutting - A series of partial cuttings designed to establish a new crop of trees under the protection of the old.

silviculture - The art of producing and tending a forest.

site class - A measure of the relative productive capacity of an area for timber or other vegetation.

slash - The branches, bark, tops, cull logs, and broken or uprooted trees left on the ground after logging has been completed.

snag - A standing dead tree from which the leaves and most of the branches have fallen.

soil - The unconsolidated mineral and organic material on the immediate surface of the earth that serves as a natural medium for the growth of land plants.

soil mapping unit - A kind of soil, a combination of kinds of soil, or miscellaneous land type or types that can be shown at the scale of mapping for the defined purposes and objectives of the survey. Soil mapping units are the basis for the delineations of a soil survey map.

Standard Industrial Classification (SIC) - An industrial classification system as defined by the Office of Management and Budget. The SIC defines industries in accordance with the composition and structure of the economy and covers the entire field of economic activity. Refer to Lumber and Wood Products for an explanation of SIC 24.

State Historic Preservation Office (SHPO) - Position established to review ES's within every state; also maintains a register of historic sites (including archeological) for the State and advises state land management agencies on archeological matters.

succession - The orderly process of community change. The process by which one plant community will succeed another over time given the same climatic conditions.

summer resident bird - Bird species present during the warmest time of the year, which generally includes the breeding season. Summer residents may stay within an area from early spring through late autumn.

sustained yield - The yield that a forest can produce continuously at a given intensity of management.

sustained yield unit (SYU) - A geographic area for which an allowable cut is determined providing for continuous, undiminishing flow of timber at a given intensity of management.

teratogen (teratogenicity) - Any substance capable of producing structural abnormalities of prenatal origin, present at birth or manifest shortly thereafter (the ability to produce birth defects).

texture (soil) - The relative proportion of sand, silt, and clay (expressed as percentages) in a soil expressed in terms of standard classes and subclasses in the USDA Soil Survey Manual.

timber activity plan - A plan which deals specifically with the implementation of the approved allowable cut.

timber production base - Acres included in the calculation of the allowable cut (see high intensity forest management lands).

Timber Production Capability Classification (TPCC) - A classification system that identifies the commercial forest land base capable of producing timber on a sustained yield basis.

true fir - A member of the genus Abies, for example white fir (Abies concolor); Douglas-fir (Pseudotsuga menziesii) is not a true fir.

understory species - Shade-tolerant plant species which characteristically grow beneath the forest canopy. Examples include blackberry and rhododendron.

unit resource analysis (URA) - A BLM planning document which contains a comprehensive inventory and analysis of the physical resources and an analysis of their potential for development, within a specified geographic area.

vegetative stratification - The "layered" appearance of a natural vegetative community. For example, a normal forest community will have a ground-level layer of grasses and herbs, an intermediate-level layer of shrubs and a canopy layer of trees.

vertebrate - An animal with a segmented bony or cartilaginous spinal column (mammals, birds, amphibians, reptiles).

visual contrast - The effect of a striking difference in the form, line, color, or texture of an area being viewed.

visual resource - The land, water, vegetation, animals and other features that are visible on all public lands.

Visual Resource Management (VRM) - Management of the visual landscape.

visual resource management classes - The degree of alteration that is acceptable within the characteristic landscape. It is based upon the physical and sociological characteristics of any given homogeneous area.

visual zones - The area that can be seen from a location and classified as foreground, middleground, background or seldom seen.

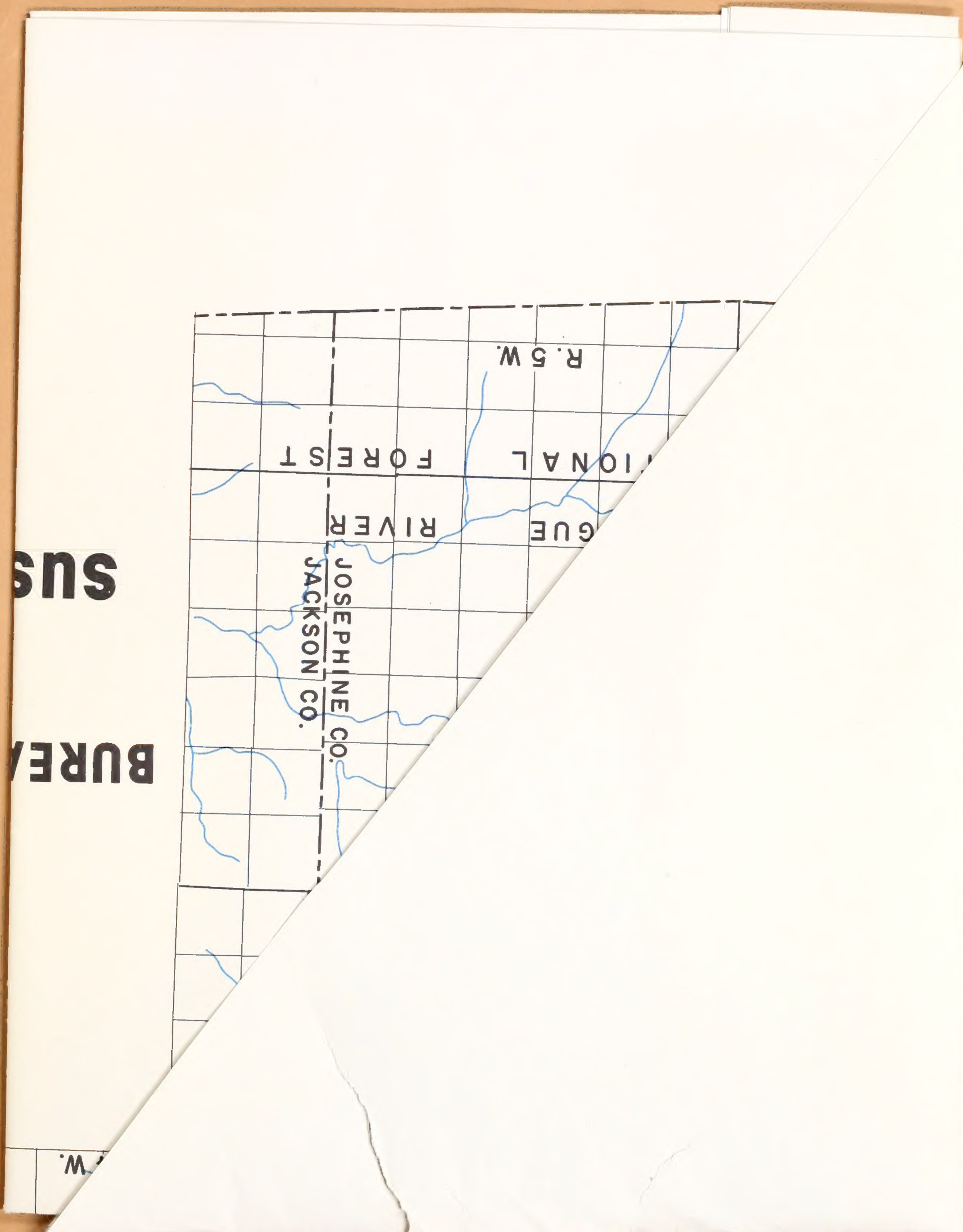
water quality, biological - The content of bacteria and other microorganisms in water. Often measured as counts of most probable number (MPN) based on statistical principles.

water quality, chemical - The content of dissolved or suspended matter, mostly solids, although dissolved gases may be important locally.

watershed - The area drained by a given stream.

winter resident bird - A bird species present only during the winter (non-breeding) season.

yarding - The initial haul to a loading point, i.e., transporting timber from the stump to a landing.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IONAL
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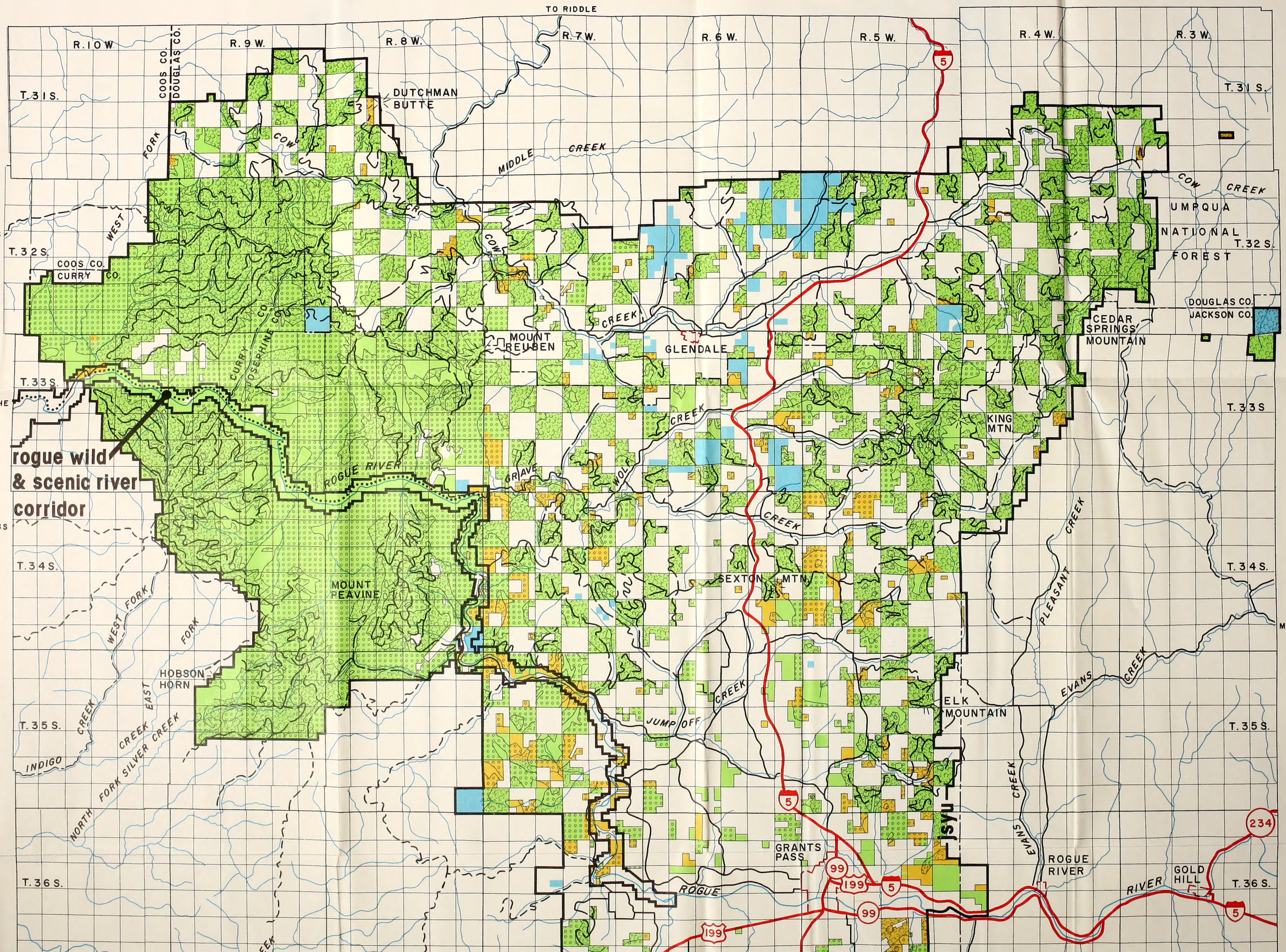

TO RIDDLE
R.10W.
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R.7W.
R.6W.
R.5W.
R.4W.
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T.31S.
T.32S.
T.33S.
T.34S.
T.35S.
T.36S.
COOS CO.
DOUGLAS CO.
CURRY CO.
JOSEPHINE CO.
JACKSON CO.
DUTCHMAN BUTTE
MIDDLE CREEK
COW CREEK
UMPQUA NATIONAL FOREST
TO POWERS
TO ILLAHE
TO AGNESS
TO MEDFORD
WEST FORK
MOUNT REUBEN
GLENDALE
CEDAR SPRINGS MOUNTAIN
KING MTN
rogue wild & scenic river corridor
ROGUE RIVER
GRAVE CREEK
WOLF CREEK
SEXTON MTN
MOUNT PEAVINE
HOBSON HORN
EAST FORK
SILVER CREEK
NORTH FORK
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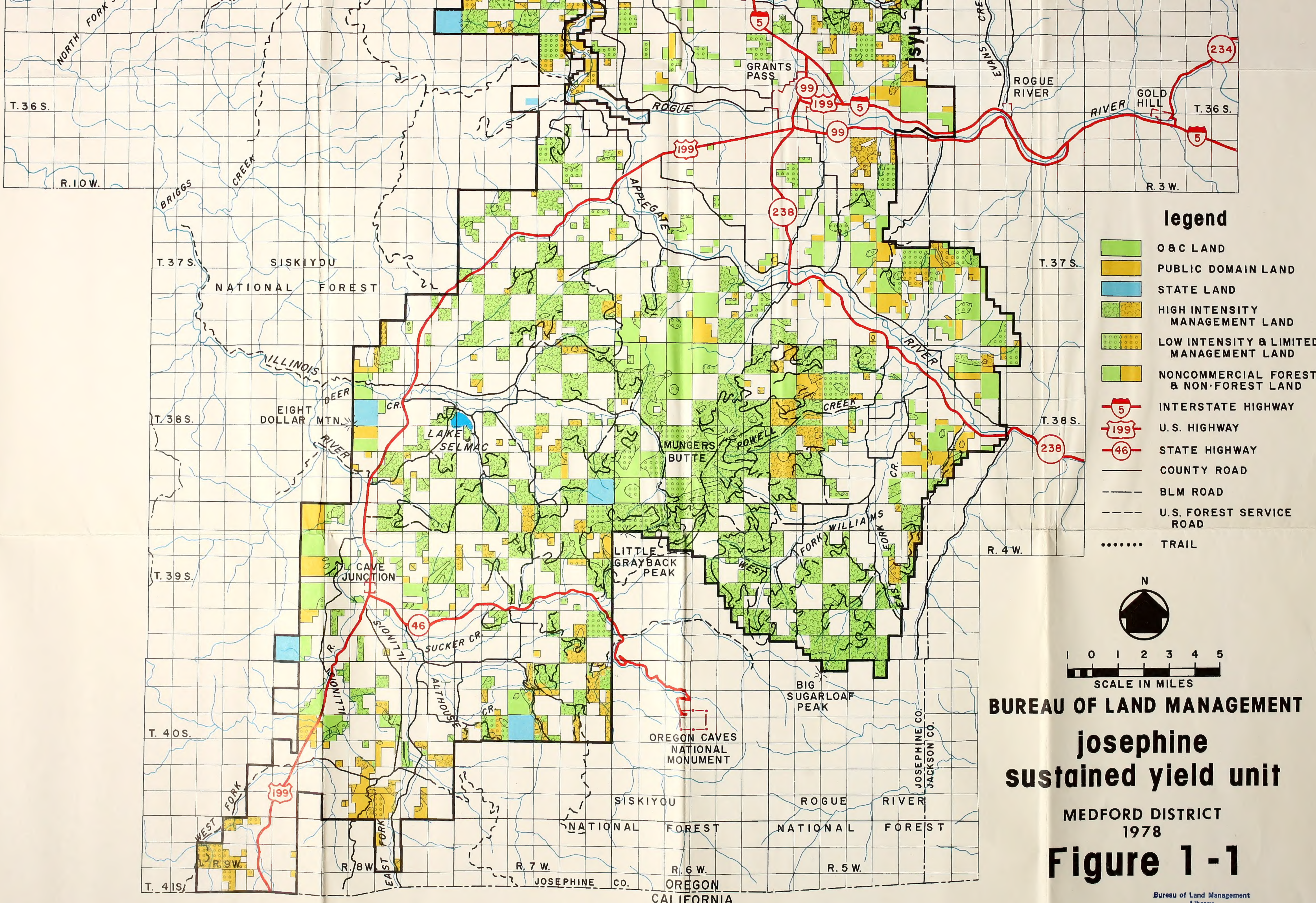
JUMP OFF CREEK
ELK MOUNTAIN
EVANS CREEK
PLEASANT CREEK
GRANTS PASS
ROGUE RIVER
GOLD HILL



BUREAU OF LAND MANAGEMENT

josephine sustained yield unit

MEDFORD DISTRICT 1978

Figure 1-1

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT